

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A SYNOPSIS OF THE GENUS *ESSIGELLA* (APHIDAE)

F. C. HOTTES

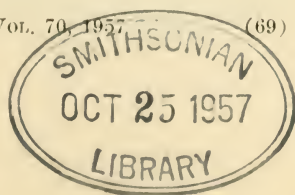
I deeply appreciate the loan of type material and named and unnamed slides from E. O. Essig. I am indebted to M. A. Palmer for the loan of type material from the Colorado Collection, for making the drawings and for her valued opinions on all species, particularly on the species described as new, but for which I take sole responsibility. A. A. Granovsky made available the type of *E. pini* Wilson which is now in his collection. G. W. Simpson sent me the material studied by Edith Patch. G. F. Knowlton sent his named and unnamed species. The United States National Museum, through Louise M. Russell made available types, and named and unnamed material. To all of these I would express my thanks.

The genus *Essigella* was erected by Del Guercio in 1909 for *Lachnus californicus* Essig, which had been described earlier that same year. *Revista di Patologia Vegetale*, Pavia, Anno III, n. 20-21, 1909. C. F. Baker, Editor of *Pomona Journal of Entomology*, Vol. 1, No. III 1909 gives a free translation of the original description. The genus was again characterized in 1920 by A. C. Baker in his *Generic Classification of the Hemipterous Family Aphididae*, at which time only two species were known to belong to the genus.

The genus *Essigella* belongs to the Subtribe *Eulachnina* Baker, which belongs to the Tribe *Lachnini* Wilson. There are three genera in the Subtribe *Eulachnina*, all of which have the rostrum obtuse, the fifth segment much reduced. The cornicles are shallow, with the base not much wider than the rim, with few or no hairs, or with the cornicles reduced to a rim. All live on the needles or leaves of *Coniferac*.

KEY TO GENERA OF EULACHNINA

1. First tarsal segment with dorsal hairs; cornicles free from hairs . . . 2  
    First tarsal segment without dorsal hairs; cornicles with some hairs ----- *Schizolachnus* Mordvilko
2. Antennae of five segments; apex of claws modified . . . *Essigella* Del Guercio  
    Antennae of six segments; apex of claws simple . . . *Eulachnus* Del Guercio



Genus *Essigella* Del Guercio

Characters.—Body elongate and narrow; head much broader than long; ocular tubercles absent. Antennae five segmented, bearing minute hairs or bristles; unguis with primary sensorium; rostrum broadly obtuse at apex. Fore wing with media simple or once branched, hind wing with both media and cubitus present. Cornicles free from hairs, reduced to mere ring, or with base only slightly larger than ring, and little raised. First tarsal segment elongate, dorsum with two or more hairs. Claws bifurcate or with only one fork developed. Cauda rounded or with median posterior tubercle. Living on the needles or leaves of *Coniferae*. Type (monotypical), *Lachnus californicus* Essig.

Baker, A. C.

1920. Generic Classification of the Hemipterous Family *Aphididae*. U. S. Dept. of Agr. Bul. 826; pp. 13-14

Baker, C. F.

1909. Concerning Two New Genera and Three New Species of Aphids of California G. Del Guercio. *Pomona Jour. Ent.* Vol. I No. 3, pp. 73-74

Essig, E. O.

1909. *Aphididae* of Southern California I. *Pomona Jour. Ent.* Vol. I, No. I pp. 1-4, figs. 1-2. (fig. 2 is a plate)

Guercio, (Del Guercio G.)

1909. Intorno a due nuovi generi e a tre specie nuove di afidi di California. *Rivista di Patologia Vegetale* Anno III. Num. 20-21 pp. 328-329. Genus *Essigella* described p. 329.

In the past, species of *Essigella* have been thought to be confined to species of *Pinus* for their host. This is no longer true; at least one species is known from *Pseudotsuga*, and one species has been taken on *Abies*.

In the descriptions I make use of two terms which I define as follows: Cape, the pigmented area on the dorsum of the body, which may extend laterally on to the venter. It is not present in all species, Brush, that area on the inner margin of the tibiae near the apex thickly clothed with fine short hairs.

All drawings, except those of *E. hoerneri* Gillette and Palmer which were drawn from paratype specimens, were drawn from either holotype, lectotype, morphotype or allotype specimens, and the measurements indicated are from those specimens. Where other measurements are given they are within brackets.

*Collection of material.* Collectors in the past have collected individual specimens of *Essigella* by closely observing the needles of pines for them. That this method is productive is witnessed by the species described herewith, but it is extremely time consuming, first because many trees are without specimens, and second the individual specimens in most cases are widely spaced, once located on a given tree. The writer prefers to collect specimens of *Essigella* as well as *Cinara* by beating, jarring the specimens from the needles, by means of a club, the handle of a prospectors pick, being ideal as to length and weight for this purpose. The specimens are then collected with forceps from the surface of a Turkish towel which has been tightly stretched over a twenty-four inch hoop to which a short handle has been attached.

Not only does the rough surface of the towel give the specimens something to hold to, but it holds them up, so that they may be easily lifted without injury. Furthermore the rough surface of the towel cuts down the movement of air, so that specimens are not easily blown away. As to color of towel, I prefer yellow, but any color that contrasts sharply with the color of most species to be collected should work.

*Rearing.* Specimens of *Essigella* may be reared on branches of the host tree placed in water, or upon young potted trees of the host species. Transfers of specimens from branches of one tree to branches of another are not always successfully made. It is best to make use of branches of the original host tree. When it is thought necessary, specimens on small twigs may be caged by placing a lamp or lantern chimney over the twig and its container, the top of the chimney being covered with cloth fastened to it by scotch tape. In special cases it is well to surround the container and chimney by a moat. The moat serving the double purpose of preventing the escape of specimens possessed of wanderlust, from the bottom, should they fall or wander from the twig, and at the same time it prevents their desiccation until discovered.

Small twigs intended for rearing specimens should always be examined for spiders and other predacious forms. As a preliminary to examination, it is well to wash off such twigs with a hose.

This past summer I was intrigued by a method used by D. Hille Ris Lambers for rearing aphids. He made use of small plastic bags as containers for the aphids and portions of their host plants. Use of this method does away with water and cage.

*Essigella agilis* n. sp.

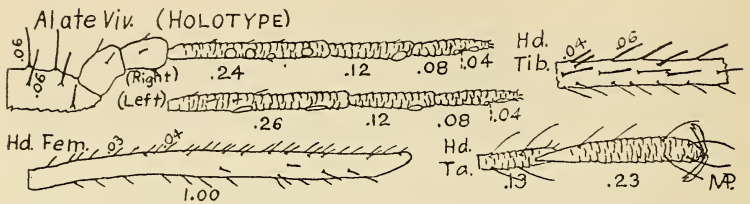
Plate I

*Essigella fusca* Gillette and Palmer, (in part) Gillette and Palmer Annals Entomological Society of America Vol. XVII 1924, pp. 6-9.

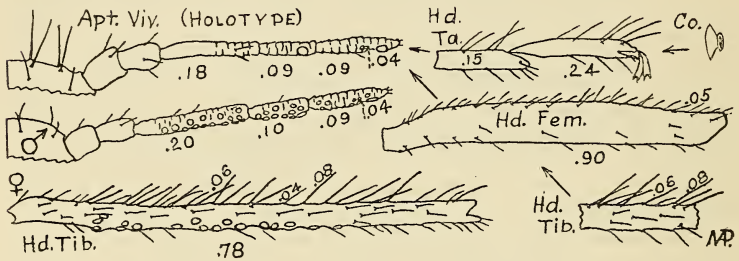
*Essigella fusca* Gillette and Palmer, (in part) Palmer Aphids of the Rocky Mountain Region pp. 14-15 1952.

*Apterous viviparous female.*

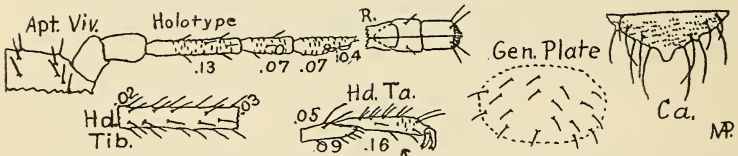
Length from vertex to end of anal plate varying from 2.62-2.75 mm. Color subject to considerable variation, some specimens pale green, others with head, thorax and cape very pale yellowish brown with some green. Apical half of fourth antennal segment and all of fifth segment dusky. Femora pale yellowish with dorsal margins brownish. Tibiae and tarsal segments brownish, but not dark. Antennal segments with the following lengths: III .18 mm., IV .09 mm., V .09 + .04 mm. There are no secondary sensoria, the third segment has no sensoria, fourth and fifth segments with primary sensoria. Prothoracic femora and tibiae about equal in length, varying from .54 — .57 mm. Mesothoracic femora shorter than prothoracic femora, mesothoracic tibiae longer than prothoracic tibiae. Metathoracic femora .90 mm. long, hairs on dorsal margin rather numerous, the longest about .05 mm. Metathoracic tibiae varying in length from 1.05 — 1.17 mm. Hairs on outer margin of metathoracic tibiae varying from .06 — .08 mm. in



*Essigella pineti* n. sp.



*Essigella agilis* n. sp.



*Essigella pergandei* n. sp.

Plate I

length, the two lengths being intermixed. The hairs on this surface are slightly dull at the apex. The hairs on the inner margin of the metathoracic tibiae are much shorter than the hairs on the outer margin, finer, and less numerous. The first segment of the metatarsus is .15 mm. in length, the second metatarsal segment is variable in length, measuring from .21 — .24 mm. The dorsum of the first tarsal segment of all legs as a rule has two pairs of hairs. The more basal pair is much shorter than the apical pair and less spine-like. The basal hairs on the prothoracic and mesothoracic first tarsal segments are often very difficult to differentiate. A few specimens have as many as five hairs on the dorsum of the metathoracic first tarsal segment. These hairs are coarse and longer than the width of segment. The dorsum of the abdomen is provided with short, rather coarse hairs, which arise as a rule from small pigmented areas which are slightly darker than the caepe. The cornicles are the color of the caepe. The median posterior tubercle on the cauda is not well developed. Holotype,

apterous viviparous female, Morphotype, oviparous female, Allotype, apterous male. All taken on *Pinus ponderosa*, south of Glade Park, Colorado. (Mud Springs area). Holotype June 26, 1956. Morphotype and allotype, October 7, 1956, these mounted on the same slide. The two type slides deposited in the United States National Museum. All specimens taken by F. C. Hottes.

Slides seen in addition to types: *Pinus scopulorum* October 1, 1922, oviparous female determined as morphotype of *E. fusca* Gillette and Palmer, Estes Park, Colorado, F. C. Hottes. Paratype slide same data as type, Paratype slide same data as Morphotype. *Pinus ponderosa*, Hat Creek, California, June 24, 1955, E. O. Essig, three slides.

As indicated in the discussion of *E. fusca* specimens of this species were held to be that species by Gillette and Palmer. Specimens of this species may be differentiated from specimens of apterous *E. fusca* by the much lighter caepe. Apterous specimens differ from apterous specimens of *E. palmerae* by having shorter hairs on the femora and tibiae, and shorter femora and tibiae.

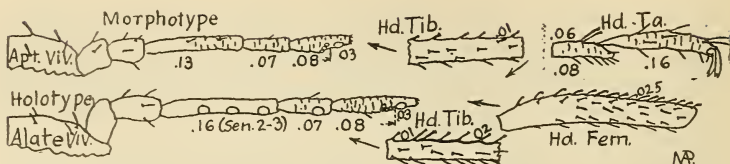
### *Essigella braggi* n. sp.

#### Plate II

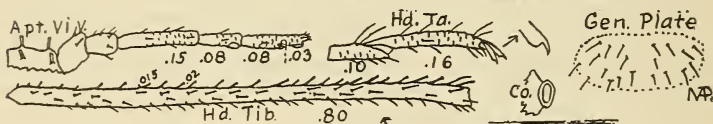
#### *Apterous viviparous female.*

Length from vertex to end of anal plate varying from 2.25 — 2.47 mm. Dorsum of head thorax and abdomen covered by a light brown caepe. First antennal segment as a rule more or less concolorous with head, second antennal segment, and varying amounts of the third pale, apex of third and all of fourth and fifth segments dusky. Femora brown, shaded with dusky, often quite dark. Tibiae brown, shaded with dusky, at times quite dark. Tarsi dark brown. Rings of cornicles dark brown.

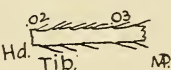
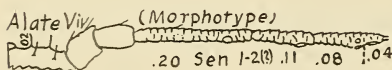
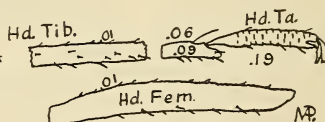
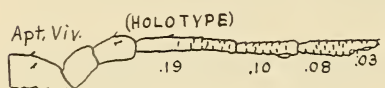
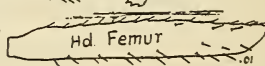
Antennal segments with the following lengths: III .195 — .23 mm., IV .09 — .12 mm., V .11 — .12 + .045 mm. The third segment is without sensoria. The primary sensoria on the fourth and fifth segments are very small and almost flat. The imbrications on the antennal segments are exceptionally well developed. Hair on antennal segments unusually well developed, distinctly spine-like, very conspicuous on the first and second and third segments, on the third segment the longest almost as long as width of segment. Vertex of head with distinct spine-like hairs which vary in length from .03 — .07 mm. Rostrum hardly reaching base of metathoracic coxae. Prothoracic femora unusually well developed, varying in length from .49 — .57 mm. provided with coarse spine-like hairs, those on the dorsal margin being dull at the apex, on one side the hairs are similar to those on the dorsum, remaining hairs less spine-like, and sharp pointed. Prothoracic tibiae varying in length from .60 — .72 mm. always conspicuously longer than prothoracic femora. Hairs on outer margin of prothoracic tibiae distinctly spine-like, dull at the end, and slightly longer than width of tibiae, but there are some hairs which are only subequal to the width of the tibiae. Hairs on remaining surface of prothoracic tibiae sharp pointed, slightly shorter, finer, but still spine-like. Mesothoracic femora about .45 mm. in length. Hair on mesothoracic tibiae much



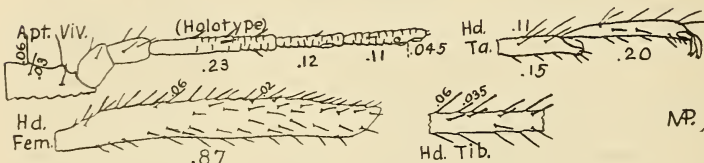
*Essigella essigi* n. sp.



*Essigella wilsoni* n. sp.



*Essigella swaini* n. sp.



*Essigella braggi* n. sp.

Plate II

shorter than the hair on the prothoracic tibiae, varying from about one third to one half the width of the tibiae. Metathoracic femora varying from .78 — .82 mm. in length. Dorsal margin of metathoracic femora with hairs more numerous than elsewhere, varying in length from .02 — .06 mm. dull at the tip and distinctly spine-like, similar hairs are found on one side of the femora, remaining hairs on this segment less spine-like, sharp pointed, the hairs on the ventral surface being few and rather fine. Metathoracic tibiae varying in length from 1.20 — 1.27 mm.

Hairs on metathoracic tibiae distinctly spine-like, varying in length from .035 — .06 mm. The hairs on the outer margin are more spine-like, and longer than the hairs on the inner margin, these hairs are also dull at the tip. On the outer margin shorter hairs alternate with longer. Dorsal surface of first metathoracic tarsal segment with two pairs of long hairs, the hairs being much longer than the width of the segment and very coarse. First tarsal segment of other legs with only one pair of hairs, and these not quite so long as those on the first tarsal segment of the metatarsus.

The first tarsal segment of the metathoracic legs varies in length from .135 — .15 mm. The second tarsal segment of the metathoracic pair of legs is .20 mm. in length, the hairs on the dorsal surface of this segment are much longer than the hairs on the ventral surface, more spine-like, and about one and one-half times the width of the segment in length.

Abdomen.—Dorsum of abdomen with a few short, rather spine-like hairs, which arise from pigmented areas. The hairs on the dorsum vary in length, the shortest being located on the anterior portion, the longest near the posterior portion of the abdomen. Hairs on ventral portion of abdomen in patches, numerous, the more lateral hairs being much longer and coarser than the hairs near the middle. Cauda and anal plate with numerous long sharp pointed hairs. Both cauda and anal plate imbricated.

This robust species may be differentiated by the coarse spine-like hairs on the antennae. From *E. fusca* Gillette and Palmer it may be differentiated by its lighter cape, larger size, shorter tarsal segments, by the fact that the dorsal surface of the pro and mesothoracic tarsal segments have only one pair of hair, and by the shorter hairs on the mesothoracic tibiae. The hairs on the outer margin of the metathoracic tibiae are also shorter and more nearly capitate than are the hairs on this segment of *fusca*.

Holotype, apterous viviparous female, taken on *Pinus contorta*, Tuolumne Meadows, California, August 22, 1955. Collected by J. W. Mae Swain. Type in the collection of E. O. Essig. Two slides of the same collection have been made paratype.

### *Essigella californica* (Essig)

#### Plate III

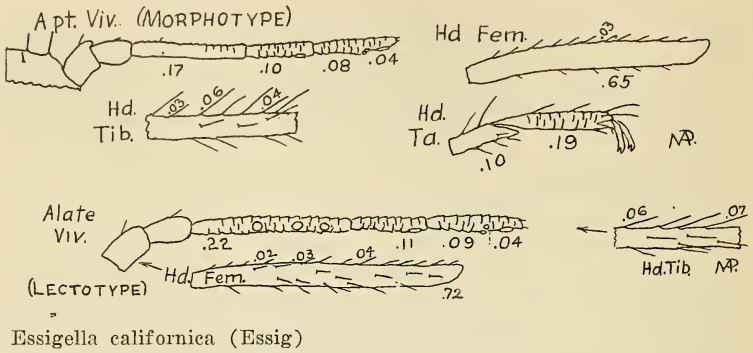
Essig, E. O.

1909. Aphididae of Southern California I. Pomona Jour. Ent. Vol. I, No. I pp. 1-4, figs. 1, 2. Original description (in part)

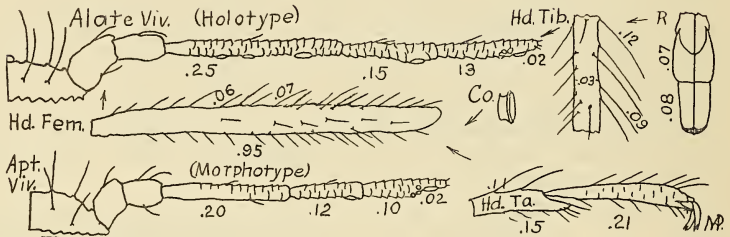
1912. Aphididae of Southern California X. Pomona College Jour. Ent. Vol. IV, pp. 780-785, figs. 247, 248. *Essigella gillettei* n. sp. Gillette, C. P. and Palmer, M. A.

Gillette, C. P. and Palmer, M. A.

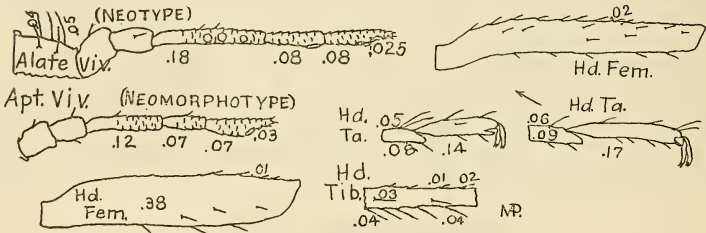
The Aphidae of Colorado, Part I. Annals Entomological Society of America Vol. XXIV 1931 pp. 838-839, fig. 9  
*Essigella gillettei* n. sp.



*Essigella californica* (Essig)



*Essigella gillettei* n. sp.



*Essigella pini* Wilson

Plate III

Patch, Edith

1912 *Aphid Pests of Maine Food Plants of the Aphids Psyllid Notes*. Maine Agricultural Experiment Station Bulletin 202. pp. 169-170 figs. 286, 287. *Essigella patchae* n. sp.

Wilson, H. F.

1919. *Three New Lachnids With Comparative Notes on Three Others (Homop.)* Entomological News Vol. XXX No. 1,



pp. 1-2, figs. 1-6. *Essigella wilsoni* n. sp., *Essigella gillettei* n. sp.

As indicated under the description of *E. essigi*, Essig did not base his original description of this species entirely upon specimens belonging to it. Nor is Essig's redescription of this species in part X Aphididae of Southern California limited to it, the material in part consisting of *E. gillettei*. The references to *californica* by Gillette and Palmer, and those of Knowlton refer to *E. gillettei*. Wilson's 1919 reference to this species was most likely based on two species, *E. wilsoni* n. sp. and *E. gillettei* n. sp. This is indicated by Wilson's figures which do not agree with his description, and by his mention of two host species. The species recorded by Patch under this name is 1912 from *Pinus strobus* belongs to *E. patchae* n. sp.

*Alate viviparous female.*

Only four specimens of this form, from the original material are known to exist, neither is perfect, and neither is in a position to measure accurately as to length. The legs are pale dusky and quite uniform in color, the antennae are the same with the base of the third segment pale. Antennal segments with the following lengths: III .22 mm., IV .11 mm., V .09 + .04 mm. The third antennal segment has three sensoria. Fourth and fifth antennal segments with only primary sensoria. Hairs on antennal segments extremely sparse, fine and short. Vertex of head with a few long sharp pointed hairs, which are about .06 mm. in length. Prothoracic femora about .42 mm. in length. Length of mesothoracic femora about .33 mm. Metathoracic femora varying from .645 — .69 mm. in length, dorsal margin with a few fine, sharp pointed hairs, which are spaced at least in part further apart than the hairs are long. Length of metathoracic tibiae of one original "cotype" specimen 1.14 mm. the tibiae of the lectotype are not complete. Hairs on metathoracic tibiae of same type on both margins, fine, sharp pointed, and varying in length from .02 — .06 mm. with the shortest hairs near the base and the longest near the apex, where the hairs are rather droopy. Hair, as indicated, on original cotype specimen, on inner margin of metathoracic tibiae, much shorter than interval between hairs on upper third of segment, about as long as width of segment elsewhere. Hair on outer margin of metathoracic tibiae about two times width of segment when measured near the apex, shorter than this elsewhere. Cauda with distinct median posterior tubercle. Cauda and anal plate with long hairs. Media forked.

*Apterous viviparous female.*

Length from vertex to end of anal plate 1.65 mm. Color in life not recorded, probably pale green, definitely without caepe. Antennae pale, legs pale dusky, tarsal segments concolorous with ends of tibiae. Antennal segments with the following lengths: III .17 mm., IV .10 mm., V .08 + .04 mm. Third antennal segment without sensoria, fourth and fifth segments with only primary sensoria. Hair on antennae almost absent. Vertex of head with a few moderately long hairs, the hairs being about as long as the width of the second antennal segment. Lengths of pro meso and metathoracic femora as follows: .375, .30, and .65 mm. Lengths of pro meso and metathoracic tibiae as follows:

.41, .45, and .90 mm. Lengths of metathoracic tarsal segments as follows: first, .10 mm., second, .19 mm. Prothoracic femora with a few hairs, hairs on dorsal margin no longer than those on vertex of head. Prothoracic tibiae with hairs on outer margin ranging in length from very short near the base, to hairs which are about equal to width of segment near the apex, the hairs on this margin are fine and sharp pointed. Hairs on inner margin of prothoracic tibiae for the most part about equal in length, and about one-third as long as the longest hairs on the outer margin. They are spaced for the most part further apart than their length. Hairs on outer margin of mesothoracic tibiae extremely short, and dull at the apex. Hairs on inner margin fewer than those on outer margin, slightly longer, and spaced much further apart than their length, more upstanding and sharp pointed. Hairs on metathoracic tibiae ranging in length from extremely short near the base to .06 mm. near the apex, fine and sharp pointed. Hairs on inner margin of metathoracic tibiae about half as long as those on outer margin, but similar to them in texture. First metatarsal segment with two pairs of hairs on the dorsum, apparently one pair of hairs is located on the dorsum of the pro and mesothoracic tarsal segments. Hairs on second metatarsal segment few and short. Median posterior tubercle on cauda well developed.

Lectotype and morphotype aphid collection of E. O. Essig. Both types are part of the original material collected on Monterey Pine, *Pinus radiata*, Claremont, California, Feb. 14, 1909. Four other slides definitely known to belong to the original material have been seen, one that of an alate belongs to this species, one of an apterous belongs to *E. gillettei* n. sp., both are in the Essig collection. The other slides are in the collection of the United States National Museum, one contains the type of *E. claremontiana* n. sp., the other contains two alates of *E. californica*. One other slide in the collection of the United States National Museum is suspected of belonging to the original material, it carries the data, "*Essigella californicus*, Claremont, Cal., E. O. Essig, on pine needles (Monterey Pine) 240.83." The printing is that of Essig. The specimen is an alate viviparous female of this species. The slide is very thick, so that it fits in a slide box with difficulty, in this respect it is similar to the slide on which the lectotype is mounted. It is also similar to the slide on which the Holotype of *E. claremontiana* is mounted. All three slides have similar cover slips and the balsam is similarly stained. I suspect that none of the labels are original, and all differ in size. The number 240.83 is not a Museum number.

Several other slides, determined by Essig as *Essigella californica* have been seen. They were taken by him on *Pinus radiata* at Santa Paula, California, June 26, 1911 and carry the number "47". Some are of *E. gillettei* n. sp. and were perhaps made use of by him in his redescription of this species which he published in 1912.

This species differs from *gillettei* in shorter fourth antennal segment, shorter tibiae and femora, and shorter, fewer and more droopy hairs on the tibiae. The hairs on the dorsal margin of the metathoracic femora are also very much shorter.

At the time Essig described this species Holotypes were not being designated by aphid workers, and it may be questioned if the slides

which constitute the remaining original material cited in the original description as "common on some cultivated pines at Claremont, California during the winter of 1908-09." but which actually carry the data, "Monterey Pine, Claremont, California, February 14, 1909," were cited as cotypes on the slides at the time of description, because only the original slides remaining in the Essig collection are so indicated. The labels on these slides are not original. As indicated here, and in the descriptions of *E. gillettei* n. sp., *E. claremontiana* n. sp., and *E. essigi* n. sp. the original material did not consist of one species.

Palmer, 1952, p. 14 indicates the type as being in the Essig collection and gives the number as "47". It may be assumed that neither Gillette or Palmer ever saw the type, they having seen only a slide bearing the number "47" determined by Essig as *californica*, now in the Colorado Aphid collection to which Palmer has added the word "metatype." The specimens on this slide were taken at Santa Paula, California, by Essig on *Pinus radiata* June 26, 1911. This slide and others with similar data have been seen. None of the slides taken at Santa Paula in 1911 are eligible for designation as holotype, lectotype or metatype. All specimens of this collection are *E. gillettei* n. sp.

*Essigella claremontiana* n. sp.

Plate IV

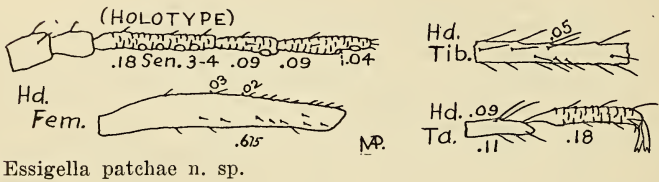
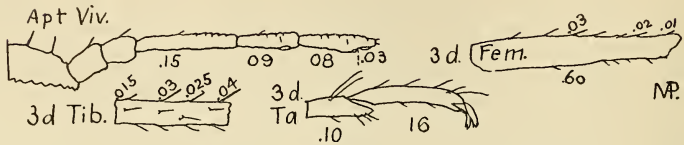
Essig, E. O. Lachnus californicus (in part)

1909. Aphididae of Southern California I. Pomona Jour. Ent. Vol. I, No. I, pp. 1-4, figs., 1-2.

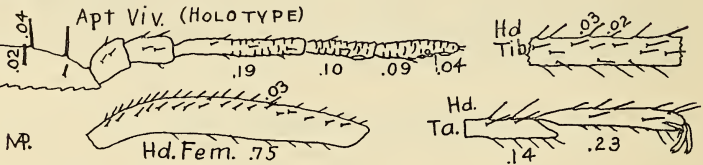
*Apterous viviparous female.*

Length from vertex to end of anal plate varying from 1.80 — 2.12 mm. Color in life not recorded, apparently without cape, apparently quite similar in color to *E. californica* and taken for that species. Antennal segments one, two, and basal portion of three concolorous with head, remaining portion of antennae dusky. Tibiae of all legs quite uniform in color, except for a slightly dusky area near apex. Tarsal segments concolorous with ends of tibiae.

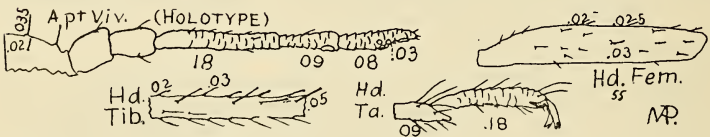
Length of antennal segments as follows: III .18 mm., IV .09 mm., V .08 + .03 mm. Fourth and fifth antennal segments with primary sensoria. Hair on antennal segments extremely short and fine, also very sparse. Rostrum extending to mid-portion or slightly beyond the metathoracic coxae. Prothoracic femora .375 mm. in length, provided with few hairs which vary in length from .02 — .03 mm. on dorsal margin, where they are slightly dull at the apex. Hairs on ventral margin of prothoracic femora about twice as long, finer and sharp pointed. Prothoracic tibiae .45 — .48 mm. in length, hairs on this segment fairly numerous, those on outer margin varying from .015 mm. near the base to .045 near the apex, where the hairs on the outer margin are the longest, however even here the hairs are shorter than the width of tibiae. All hairs on the outer margin of the tibiae are coarse and dull at the apex, with the exception of one or two hairs near the apex. The basal hairs on this margin are spaced much further apart than their length. Remaining surface of this segment provided with finer



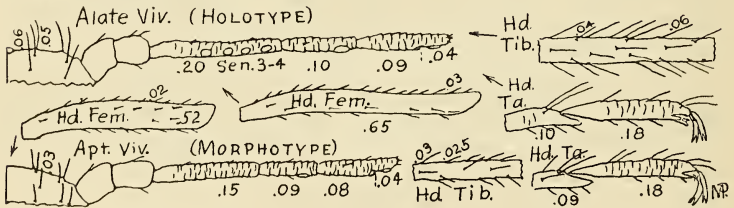
*Essigella patchae* n. sp.



*Essigella robusta* n. sp.



*Essigella claremontiana* n. sp.



*Essigella maculata* n. sp.

Plate IV

sharp pointed hairs, which show less variation in length than those on the outer margin.

Near the apex of the tibiae on the inner margin there is a brush of short fine hairs, the hairs on this segment are extremely few, those on the outer margin are very short, while those on the inner margin show considerable variation in length despite the fact that all are short, the

longest hairs being shorter than one-half width of tibiae. The hairs on the outer margin of the mesothoracic tibiae are coarse and distinctly capitate, those on the inner margin are fine and sharp pointed. The metathoracic femora vary in length from .55 — .67 mm. The dorsal margin of this segment is provided with coarse short hairs, which are dull if not actually capitate at the apex. They are spaced much further apart than their length. The hairs on the ventral margin, and lateral surfaces of this segment are only slightly finer, but are sharp pointed. Hairs on metathoracic tibiae varying in length from .015 mm. near the base to .045 mm. near the apex. These hairs are dull or capitate at the apex, and are rather coarse. The longest hairs at the apex are only slightly longer than the width of segment at this point. The hairs on the inner margin of the metathoracic tibiae are fewer in number than those on the outer margin. They are sharp pointed and shorter in length than the width of the tibiae. The metathoracic tibiae vary in length from .77 mm. to .90 mm. First metatarsal segment .09 mm in length, the dorsal surface of this segment has one pair of hairs, which are as long or longer than the width of segment, there are very few hairs on the ventral surface of this segment. Second metatarsal segment .18 mm. in length, both ventral and dorsal surfaces with very few, fine short hairs, the hairs near the apex being longest. Cornicles dusky, distinctly darker than the abdomen. Median posterior tubercle on cauda poorly developed. Both cauda and anal plate with long fine hairs.

This species may be differentiated at once from *E. californica* (Essig) by the shorter hairs on the tibiae, and by the hairs on the outer margin being blunt at the apex, and by fewer, shorter hairs on the femora. From *E. pini* Wilson it may be differentiated by a greater number of hairs on the metathoracic tibiae by the hairs being capitate, and by the poorly developed median posterior tubercle on the cauda. From apterous forms of *E. patchae* it differs in having a longer third antennal segment, shorter first and longer second metatarsal segments, in length of hind tibiae and in having shorter hairs on the basal region of outer margin of tibiae.

Holotype, apterous viviparous female, in the collection of the United States National Museum. Host, *Pinus radiata*, February 14, 1909, Claremont, California. It will be noted that the data associated with this slide is the same as that associated with "type slides" of *E. californica* (Essig). The slide was determined as *Essigella californica* (Essig), and the printing on the original label which is in poor condition appears to be that of Essig, but the two labels on this slide differ from those on "cotype" slides which I suspect are not original. None of the adults indicated as cotypes now in the Essig collection belong to this species.

I have seen two other slides, both in the United States National Museum. One, 124083 "on needles of Monterey Pine" det. as *Essigella californicus*, Claremont, California, but with no other data, I take it to be of the original material, and the printing is that of Essig. The other slide carries only the name *Essigella californicus* Essig, and California.

**E. cocheta** n. sp.

## Plate I

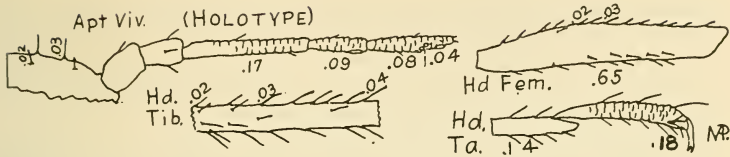
*Apterous viviparous female*

Length from vertex to end of anal plate varying from 1.97 — 2.25 mm. Color not recorded from life, cleared specimens are pale yellowish dusky, femora pale yellowish shaded with dusky, tibiae dusky tan uniform throughout, tarsal segments concolorous with tibiae. First antennal segment pale dusky, second segment and basal two thirds of the third segment pale, remaining antennal segments dusky. Cape hardly differentiated from rest of abdomen but slightly darker.

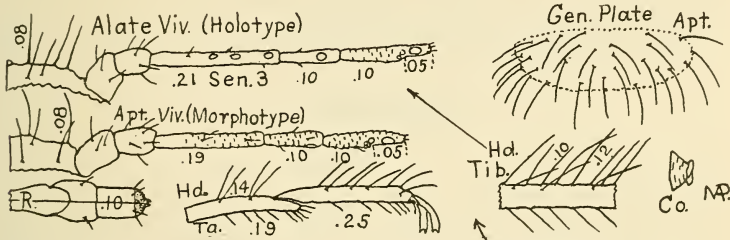
Anterior margin of head with hairs about .05 mm. in length. Length of antennal segments as follows: III .195 — .225 mm., IV .105 mm., V .09 — .105 + .03 mm.

There are no sensoria on the third antennal segment, the primary sensoria on the fourth and fifth antennal segments are small and not tuberculate, that on the fifth segment located very close to the end of the unguis. Antennal hair sparse, short and fine. Rostrum when extended reaching to the middle of metathoracic coxae. Length of pro, meso and metathoracic femora as follows: .45, .375, and .70 mm. Length of pro, meso, and metathoracic tibiae as follows: .555, .60, and 1.08 mm. Length of first and second tarsal segments of the metathoracic legs as follows: .105 and .165 mm. Prothoracic femora with hairs on dorsal margin .045 mm. in length, not numerous, these hairs taper to a moderately dull apex, remaining hairs on this segment somewhat finer and slightly longer. Hairs on outer margin of prothoracic tibiae .03 mm. in length with somewhat shorter hairs near the base, and slightly longer hairs near the apex. Only the hairs near the apex on the outer margin are sharp pointed, the other hairs being moderately dull.

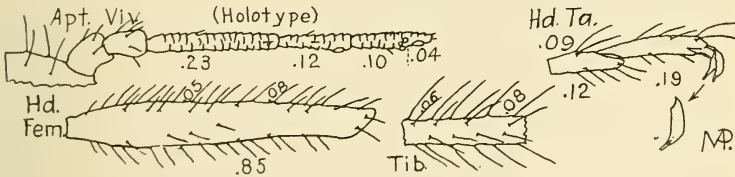
Hairs on inner margin of prothoracic tibiae fine, sharp pointed, and for the most part shorter than those on the outer margin. The hairs on the dorsal margin of the mesothoracic femora are about .015 mm. in length, fine and sharp pointed, remaining hairs on this segment are slightly longer and finer, with the hairs on the ventral margin longest, as well as fewest. The hairs on the outer margin of the mesothoracic tibiae are dull at the end and vary from .015 mm. to slightly less in length. The hairs on the inner margin are finer but about the same length, they are also sharp pointed. The hairs on the dorsal margin of the metathoracic femora are not numerous, being limited to about two rows, they are about .045 mm. in length, slightly coarse, tapering to a dull point, remaining hairs on this segment slightly longer, finer and definitely sharp pointed. The hairs on the ventral margin of the metathoracic femora are sparse, but by far the longest hairs on this segment. Metathoracic tibiae with fairly numerous hairs on the outer margin, the hairs vary in length from .015 — .075 mm. They are rather up-standing, coarse and definitely dull at the end. Hairs on the inner margin of the metathoracic tibiae measure up to .075 mm. in length with the hairs near the apex of segment shortest, the hairs on this margin are slightly finer, not quite so numerous and sharp pointed. The first tarsal segment has one pair of hairs on the dorsal surface, the hairs are rather coarse and longer than the width of segment. The



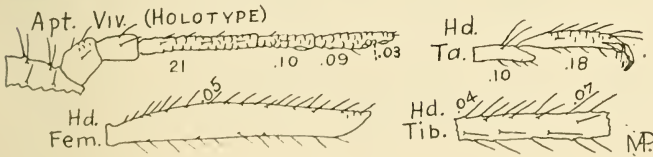
*Essigella knowltoni* n. sp.



*Essigella palmerae* n. sp.



*Essigella monelli* n. sp.



*Essigella cocheta* n. sp.

Plate V

hairs on the dorsum of the second metatarsal segment are no longer than the width of segment, those on the ventral surface of this segment are fine and short. Tarsal claws not definitely divided at the end, appearing as though only one of the bifurcations developed, the other remaining rudimentary.

Hairs on dorsum of abdomen in transverse rows, short, sparse, sharp

pointed. Hairs just anterior to cauda coarser and darker than others. Genital plate longer than wide with sides only slightly wavy but with no teeth. Cauda and anal plate normal.

Holotype, apterous viviparous female, mounted on same slide as holotype of *E. monelli* and with the same data.

This species shows much in common with *E. monelli*, differing in the shorter leg segments, shorter hairs, and fewer hairs on dorsal margin of metathoracic femora. It may be differentiated from *monelli* by the hairs on the dorsal surface of the second metatarsal segment being shorter than the width of segment.

Several specimens of this species are mounted on the Holotype slide.

### *Essigella essigi* n. sp.

#### Plate II

#### *Alate viviparous female*

Length from vertex to end of anal plate varying from 1.61 — 1.82 mm. Color in life not recorded. Mounted, cleared specimens indicate the head and thorax as pale dusky, the abdomen may be either pale green or yellowish with transverse rows of small pigmented spots. Cauda and anal plate dusky. Antennae concolorous with head, as a rule with the base of the third segment pale. Legs pale dusky, quite uniform in color. Costal margin of wing pale dusky.

Antennal segments with the following lengths: III .16 mm., IV .07 mm., V .08 + .03 mm. The segments showing very little variability as to length. Third antennal segment with from one to three sensoria. All antennal segments imbricated. Antennal hair sparse and minute. Anterior margin of head with a few short blunt hairs. The rostrum reaches to the metathoracic coxae. Dorsal margin of metathoracic femora with short, blunt curved hairs, the hairs being spaced about a hair length apart, other hairs on this segment sharp pointed and sparse. Prothoracic femora about .30 mm. in length, with numerous sharp pointed hairs. Prothoracic tibiae with numerous hairs, those on the outer margin shorter than the others and dull at the end, all hairs on this segment much shorter than the width of segment. Mesothoracic femora about .24 mm. in length, fewer hairs than in the case of the prothoracic femora. Metathoracic femora varying from .50 — .52 mm. in length. Metathoracic tibiae varying from .63 — .67 mm. Hairs on outer margin of hind tibiae much shorter than width of tibiae, rather coarse, and dull at the end, remaining tibial hairs slightly longer, but still shorter than width of segment, sharp pointed. Hairs on inner margin of tibiae fewer than those on outer margin. First tarsal segment .08 mm. in length, second metatarsal segment .16 mm. long. Dorsal surface of first segment with two hairs, which are about twice as long as the width of segment and dull at the end. Costal margin of wings slightly fuscous. Media simple, with one or two exceptions, and these abnormal in some respect. Most specimens show the stigma and the cell formed by the radial sector continuous and of the same color.



Cornicles mere rings. Cauda with distinct median tubercle. Genital plate with hairs evenly distributed over the surface.

*Apterous viviparous female.*

Length from vertex to end of anal plate varying from 1.57 — 1.82 mm. Color not recorded. Head and prothorax dusky brown, remainder of thorax and abdomen with a deep dusky brown cape. Color of remaining structures much as in alate viviparous female.

Antennal segments with the following lengths: III .13 mm., IV .07 mm., V .08 + .03 mm. The segments show almost no variation. The third and fourth antennal segments show no sensoria. The sensorium on the fifth segment is on the unguis. The rostrum reaches to the metathoracic femora. Hairs on prothoracic femora much shorter than the hairs on this segment in the alate female. Dorsal margin of the metathoracic femora with rather short curved hairs, spaced slightly farther apart than their length, these hairs are dull at the tip. The average length of the prothoracic femora is .26 mm., the average length of the mesothoracic femora is .23 mm. In length the metathoracic femora vary from .345 — .45 mm. The metathoracic tibiae are about .51 mm. in length. All hairs on the tibiae are short, those on the outer margin are dull at the tip, they are also rather thick. Remaining features as in the alate viviparous female.

Holotype, alate viviparous female. Morphotype, apterous viviparous female. Both types returned to the collection of E. O. Essig. Host, *Pinus radiata*, Redwood City, California, June 10, 1939. Collected by L. Blanc.

I am sure that specimens of this species were part of the original material from which Essig described *Lachnus californicus*, although there is no actual proof in the remaining cotype material. That this supposition is most likely true is strongly suggested by Essig's illustration fig. 2, which fail to indicate the long hairs on the tibiae. Essig's figure of the alate of *californicus* is not of this species, as is indicated by the wings, nor does this species appear to have been present in the material when *californicus* was described for the second time in part ten of "Aphididae of Southern California."

*E. essigi* may be differentiated from *E. californica* (Essig) as here restricted by the shorter hairs on the tibiae, and by the fact that some hairs are blunt. The wings of the alates differ. *E. essigi* also has a distinct cape.

Slides seen:

Sixteen paratype slides with same data as types. *Pinus radiata*, Stanford University, California, April 25, 1930. P. S. B. *Pinus coulteri*, Stanford University, California, March 8, 1931, P. S. B. *Pinus* sp. Imperial County, California, May 1, 1953, Ed. Fish. Twelve slides, Pine, Los Angeles, California, Lot 44 - 1199, United States National Museum. *Pinus tuberculata* Feliciano Mt. Mariposa County, California, July 25, 1946 H. P. Chandler *Pinus radiata*, Berkeley, California, November 10, 1935, E. O. Essig.

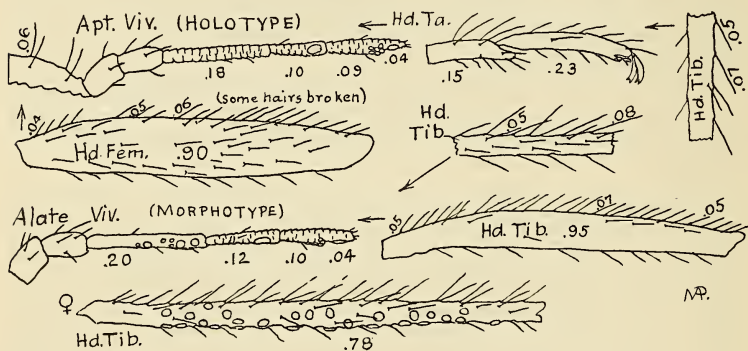
*Essigella fusca* Gillette and Palmer

Plate VI

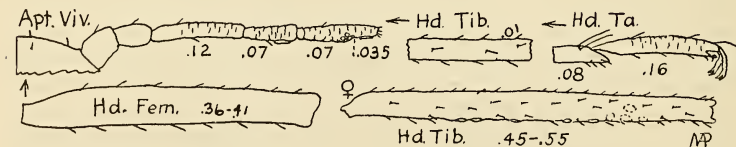
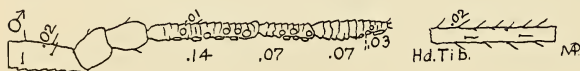
*Essigella fusca* Gillette and Palmer, 1924: 6 (original description) and 1931: 839 (in part).

*Apterous viviparous female*

Length from vertex to end of anal plate approximately 2.10 mm. Color of body deep dark blackish brown. Dark color due to color of cape for most part but ventral surface is also dark. Femora similar to color of body, tibiae dark brownish dusky, tarsal segments concolorous with ends of tibiae. Antennal segments with the following lengths: III .18 mm., IV .10 mm., V .09 + .4 mm. Hairs on first and second antennal segments long, some hairs on second segment almost half as long as width of segment. Hair on other antennal segments sparse, but rather coarse. Hairs on anterior margin of head about .06 mm. in length, rather coarse. Rostrum extending to coxae of metathoracic legs. Lengths of pro and metathoracic femora .55 and .90 mm. Lengths of pro and metathoracic tibiae .675 and 1.20 mm. Hairs on prothoracic femora coarse, on dorsal margin about .06 mm. in length. Hairs on



*Essigella fusca* Gillette and Palmer



*Essigella hoeneri* Gillette and Palmer

Plate VI

outer margin of prothoracic tibiae about .075 mm. in length, coarse, rather dull at the apex. Hairs on inner margin of prothoracic tibiae few, widely spaced, sharp pointed, much shorter than width of segment, in contrast to the hairs on the outer margin which are slightly more than two times width of segment. Hairs on outer margin of mesothoracic tibiae shorter than width of segment and almost capitate at the apex. Dorsal margin of metathoracic femora with hairs varying from .05 — .06 mm. in length, fairly numerous. Hairs on outer margin of metathoracic tibiae varying in length from .05 — .08 mm. coarse hairs on inner margin of metathoracic tibiae few, shorter than width of segment, and for the most part spaced further apart than their length. Metatarsal segments .15 and .23 mm. in length. Dorsal surface of all first tarsal segments with two pairs of hairs. Hairs on dorsal surface of second metatarsal segment about two times width of segment in length. Dorsum of abdomen with comparatively few short coarse hairs which arise from small pigmented spots, on the anterior portion of the abdomen these hairs are arranged in irregular transverse rows, near the posterior the hairs are scattered. Hairs near posterior of abdomen, and those on cauda and anal plate coarse. Cornicles not differentiated in color from caepe.

*Alate viviparous female*

Length from vertex to end of anal plate approximately 2.70 mm. Color not recorded but not nearly so dark as the apterous viviparous females. Antennal segments with the following lengths: III .20 mm., IV .12 mm., V .10 + .04 mm. Third antennal segment with from three to four normal sized sensoria and about four very much smaller sensoria. Hairs on first and second antennal segments very well developed, remaining antennal segments with normal hair. Anterior margin of head with hairs about .09 mm. in length. Lateral lobes of thorax with hairs confined largely to inner portion of lobes. Median posterior lobe of thorax with very few hairs. Prothoracic femora varying in length from .52 — .60 mm. provided with numerous hairs of about equal length. Prothoracic tibiae varying from .60 — .69 mm. in length, with the hairs on the outer margin about .08 mm. long, hairs on inner margin shorter than width of segment, few, and less coarse than the hairs on the outer margin. Mesothoracic femora with fewer and much shorter hairs on the prothoracic femora. Mesothoracic tibiae with hairs few and shorter than width of segment on both margins, hairs on inner margin much fewer and finer than the hairs on the outer margin. Hairs on dorsal margin of metathoracic femora numerous, varying in length from .05 — .07 mm. Some of the remaining hairs on this segment longer than the longest on the dorsal margin. Hairs on outer margin of metathoracic tibiae coarse varying in length from .05 — .08 mm. Hairs on inner margin of this segment fewer, finer and shorter than width of segment. The hairs on the outer margin of the metathoracic tibiae are almost dull at the apex, those on the inner margin are sharp pointed. Metatarsal segments .15 and .225 mm. in length. All first tarsal segments with two pairs of hairs on the dorsum. Dorsum of abdomen with numerous pigmented spots, each provided with a hair. The spots vary in size. They are arranged in irregular transverse rows, and some may be joined to produce a spot which is two or three times longer

than wide. Cornicles pigmented rings. Cauda and anal plate with numerous coarse hairs.

The original description of this species was based on two species as is indicated from the description and an examination of the type material. Palmer's 1952 description under this name also applies to two species. Knowlton's records probably apply only to the form here described as *E. agilis*. The name *E. fusca* in this paper is restricted to specimens which agree with the lectotype, an apterous viviparous female, in the United States National Museum, indicated as "type" by Palmer 1952. This form and oviparous females as well, have a very dark cape, referred to in the original description of the viviparous female as "marked on entire dorsum by solid dusky patch."

Part of the original description of the apterous viviparous female applies to the species described as *E. agilis*. The original description of the alate viviparous female applies only to specimens of *E. fusca* for specimens from which the description of this form was made were offspring of the lectotype. The original description of the male most likely applies to the male of *E. agilis*. The original description of the oviparous female is that of *E. agilis*, but specimens of this form which belong to *E. fusca* have a very dark cape, similar to that of the apterous viviparous females. The specimens mentioned as being taken by Bragg in Denver are not of this species.

This species is most likely closely allied to *E. palmerae* from which apterous specimens may be differentiated by the presence of the very dark cape. Both apterous and alate specimens differ from similar specimens of *E. palmerae* by the much shorter hairs on the femora and tibiae, and shorter tarsal segments.

Holotype apterous viviparous female, United States National Museum No. 41953. Host, *Pinus ponderosa* Rocky Mt. National Park. (Craggs Hill, near Bald Pate Inn) July 12, 1923, Coll. M. A. Palmer. Morphotype, alate viviparous female, same host, reared from lectotype, July 27, 1923, Coll. M. A. Palmer.

#### *Essigella gillettei* n. sp.

#### Plate III

*Essigella californica* (in part) Essig, E. O. Aphididae of Southern California X. Pomona College Journal of Entomology 1912 Vol. IV pp. 780-785.

*Essigella californica* Palmer, 1952, p. 14

#### *Apterous viviparous female*

Length varying from 1.87 - 2.25 mm. Color pale green, speckled with dusky at base of hairs, legs and antennae pale dusky. Length of antennal segments as follows: III .20 - .21 mm., IV .12 - .13 mm., V .09 - .10 + .02 mm. There are no secondary sensoria. Lengths of pro meso and metathoracic femora varying as follows: .45 - .47 mm., .37 mm., .67 - .82 mm. Lengths of pro meso and metathoracic tibiae varying as follows: .51 - .57 mm., .50 - .60 mm., 1.02 - 1.05 mm. Hairs on anterior margin of head coarse and about .06 mm. in length. Hairs on outer margin of prothoracic tibiae numerous and about .075 mm. in length, much longer than width of tibiae, and much longer than hairs on inner

margin. Hairs on prothoracic femora about .06 mm. length. Hairs on mesothoracic femora few and much shorter than the hairs on the prothoracic femora. Hairs on outer margin of mesothoracic tibiae few and about one and a half times width of segment. Hairs on inner margin of mesothoracic tibiae hardly half width of tibiae in length. Hairs on dorsal margin of metathoracic femora about .07 mm. in length, coarse, numerous, longer and coarser than other hairs on this segment. Hairs on outer margin of metathoracic tibiae varying in length from .06 mm. near base to .09 mm. near middle. The hairs on this segment are numerous, coarse and sharp pointed. Hairs on inner margin of metathoracic tibiae few, hardly equal to width of segment and quite upstanding. First tarsal segment of pro and mesothoracic legs with one pair of hairs on the dorsum, this segment of the metathoracic legs has two pairs of hairs. Hairs on dorsum of second metatarsal segment much longer than width of segment. Median posterior tubercle on cauda moderately well developed.

*Alate viviparous female*

Length varying from 1.80 -2.40 mm. Head and thorax dusky, abdomen pale green, with very pale pigmented spots arranged in transverse rows. First and second antennal segments concolorous with head, base of third antennal segment pale, remainder of antennae dusky. Legs dusky with the metathoracic legs darkest. Antennal segments with the following lengths: III .25 mm., IV .15 mm., V .13 + .02 mm. Third antennal segment with from two to four sensoria. Lengths of pro meso and metathoracic femora as follows: .55 - .63 mm., .37 .45 mm., .97 - 1.05 mm. Lengths of pro meso and metathoracic tibiae varying as follows: .67 - .72 mm., .71 - .75 mm., 1.42 - 1.72 mm. Lengths of metathoracic tarsal segments .15 and .21 mm. Prothoracic femora with numerous hairs over all of surface, the hairs being about .07 mm in length. Mesothoracic femora with few short fine hairs, the hairs being not much longer than .02 mm. Dorsal margin of metathoracic femora with numerous long coarse hairs which are about .07 mm. in length, hairs on ventral surface of this segment much shorter and finer in texture, also fewer in number. Hairs on outer margin of prothoracic tibiae numerous about .10 mm. in length, hairs on inner surface of this segment fewer and hardly as long as width of segment. Hairs on outer margin of mesothoracic tibiae about one-third longer than width of segment, hairs on inner margin of this segment shorter than width of segment. Hairs on outer margin of metathoracic tibiae numerous, long and fine, sharp pointed. The hairs on this margin are about three times the width of segment in length and vary from about .09 mm. near the base to about .12 mm. near the middle of segment. Hairs on inner margin of metathoracic tibiae few, upstanding, fine and short. Metathoracic tarsal segments .15 mm. and .21 mm. in length. The dorsum of the first metatarsal segment has two pairs of hairs, the first tarsal segments of the other legs has only one pair of hairs. Media once branched. Dorsum of abdomen with from three to four rows of small pigmented spots each giving rise to a short hair. Cornicles dusky. Cauda and anal plate dusky. Median posterior tubercle on cauda not well developed.

This new species has been recorded in aphid literature in part by

Essig in his redescription of *E. californica* in part X of his "Aphididae of Southern California." The records to *E. californica* (Essig) of Gillette and Palmer, of Palmer, and of Knowlton refer to this species. It is suspected that part of the material described by Wilson under the name *E. californica* belonged to *E. gillettei*. Gillette and Palmer and Palmer 1952 have described all forms of this species. This species is allied to *E. californica*, and differs from it, in longer antennae, longer legs, longer and more upstanding hairs on tibiae, longer hairs on dorsum of metathoracic femora, longer tarsal segments

Holotype, alate viviparous female, taken on *Pinus murrayana*, Stove Prairie Hill, Bellevue, Colorado, June 16, 1922, Coll. M. A. Palmer. Morphotype apterous viviparous female, same data as holotype except for date June 14, 1922 Coll. by M. A. Palmer and M. F. C. Both types deposited in the United States National Museum. *Pinus murrayana* the host recorded for this species by Gillette and Palmer is a synonym of *Pinus contorta*. This species has also been taken on *Pinus ponderosa*, *Pinus radiata* and *Pinus albicaulis*.

Part of the material taken by Essig on *Pinus radiata* June 26, 1911 at Santa Paula, California and recorded by him under the name *E. californica* and the number "47" is of this species. L. G. Gentner took this species on *Pinus albicaulis* October 2, 1956 at Crater Lake, Oregon.

#### *Essigella hoerneri* Gillette and Palmer

##### Plate VI

*Essigella hoerneri* Gillette and Palmer, New Colorado Lachnini. Annals Entomological Society of America Vol. XVII pp. 5 - 6, 1924. Original description.

The type slide of this species, on which the lectotype is indicated is in the United States National Museum. It has been seen, together with several slides indicated as paratypes. I collected this species for the first time since 1922 in the summer of 1956 after looking for it for years. As indicated by Palmer in Aphids of the Rocky Mountain Region, it was abundant. I was attracted to the tree on which I collected the specimens by a flock of small birds which I suspected of feeding on a species of *Cinara*. Not finding specimens of that genus, I directed my search to *Essigella* which I found without difficulty. This was early in July, from this time onwards specimens were reared on twigs, and followed on the tree on which they had been taken originally some miles north of Rifle, Colorado, to the time when the sexual forms were produced. At no time were alate specimens produced, I suspect they are produced but once a year, perhaps the second generation.

##### *Apterous male*

Length from vertex to end of anal plate .975 mm. Head and thorax pale greenish dusky, abdomen pale green, free from pigmented spots. First antennal segment pale, third segment pale at base, remainder of antenna dusky. All femora and tibiae pale, tarsal segments light dusky. Length of antennal segments as follows: III .14 mm., IV .07 mm., V .07 + .03 mm.

Third antennal segment with 7 - 10 small tuberculate sensoria. Fourth antennal segment with 4 - 7 small sensoria. Metathoracic femora .30 mm. in length, length of metathoracic tibiae .465 mm. Length of first metatarsal segment .06 mm., length of second metatarsal segment .135 mm. Anterior margin of metathoracic femora with a row of very short hairs, remainder of segment with very few hairs. Hairs on metathoracic tibiae similar to those of apterous females. Dorsum of first tarsal segment of pro and mesothoracic legs with one pair of hairs, dorsum of metathoracic first tarsal segment with two pairs of hairs.

*Apterous viviparous female*

Gillette and Palmer, and Palmer 1952 have described the apterous viviparous and oviparous females of this species. Length from vertex end of anal plate from 1.375 - 1.5 mm. Head and thorax very pale dusky, abdomen pale green, with caep extremely pale dusky, always present but at times difficult to differentiate, nor is the caep of the abdomen always continuous, at times taking the form of broad transverse bands. Antennal segments with the following lengths: III .12 mm., IV .07 mm., V .07 + .035 mm. Lengths of pro meso and metathoracic femora as follows: .33 mm., .325 mm., .36 - .36 mm., .33 mm., .48 - .55 meso and metathoracic tibiae as follows: .30 - .36 mm., .33 mm., .48 - .55 mm. Vertex of head with a few very short blunt hairs. Hairs on antennal segments extremely sparse, and very very short, but at the same time coarse. Imbrications on antennal segments very coarse, and wide apart. Rostrum with last three segments extending beyond metathoracic coxae. Dorsal margin of metathoracic femora with few hairs, the hairs being slightly curved and spaced further apart than their length, but little longer than the hairs on the vertex of the head and dull at the apex. Remaining hairs on the metathoracic femora slightly longer and sharp pointed. Hairs on tibiae comparatively few, short, about .01 mm. in length or slightly longer near the apex of the segment, spaced as a rule further apart than their length, and much the same on both outer and inner surfaces. Metatarsal segments with the following lengths: .08 and .16 mm. first segment of this pair of legs with two pairs of hairs on the dorsum, the more basal pairs of hairs being shorter and finer than the hairs closer to the apex, and much harder to differentiate, therefore vary apt to be overlooked or suspected of being missing. First tarsal segments of pro and mesothoracic legs with only one pair of hairs on the dorsum. Genital plate deeply excavated in mid anterior region, sometimes almost divided. Hairs on ventral surface of abdomen not numerous but confined to slightly pigmented transverse bands, much longer than hairs on the dorsum which are exceedingly short, few, and scattered over the surface. Cauda with median posterior tubercle only slightly developed, but always visible.

The host of this species is *Pinus edulis*. Palmer also records *Pinus ponderosa* and *Pinus flexilis*. The holotype is in the United States National Museum. Male reared on *Pinus edulis*, taken October 3, 1956, Grand Junction, Colorado, lost in process of repairing slide. The male was reared from specimens taken north of Rifle, Colorado. The drawings of the viviparous and oviparous females are from paratype specimens in the Colorado collection.

Slides of this species seen as follows: Lectotype with the following

data: *Pinus edulis*, Owl Canyon, Larimer County, Colorado, September 25, 1921 J. L. Hoerner in United States Natural Museum.

*Pinus edulis*, Owl Canyon, Larimer Co., Colorado, September 25, 1921, September 28, 1921, November 6, 1921. The slide taken November 6th contains the oviparous female drawn and indicated as morphotype by Professor Palmer. *Pinus flexilis*, Estes Park, Colorado, July 22, 1922, slide indicated as metatype. *Pinus edulis*, Rifle, Colorado, August 17, 1956, Grand Junction, Colorado, September 2, 1956, September 10, 1956, September 21, 1956.

***Essigella knowltoni* n. sp.**

Plate V

*Essigella pini* Wilson (in part) Palmer 1952 p. 16

*Apterous viviparous female*

Length from vertex to end of anal plate varying from 1.82 - 2.10 mm. Color in life not recorded. Mounted specimens which have not been cleared show the head dusky yellow, this continues on to the prothorax, remainder of body dark brown, the brown being in the form of a cape which continues on to the ventral surface of the abdomen. First, second and basal third of third antennal segments pale, remainder of antennae pale dusky. Femora and tibiae of prothoracic legs dusky and quite uniform in color. Mesothoracic femora and tibiae quite similar to these segments on the prothorax. Metathoracic femora and tibiae dusky throughout, darker than segments on anterior legs, with dorsal margin of femora darkest. All tarsal segments dusky, slightly darker than ends of tibiae. Cornicles not differentiated from caepe, situated on distinctly raised areas.

Antennal segments with the following lengths: III .165 - .17 mm., IV .075 - .09 mm., V .08 + .04 mm. Third segment without sensoria, fourth and fifth segments with primary sensoria. Hair on antennae minute. Rostrum when extended reaching to end of metathoracic coxae. Hair on anterior margin of head .03 mm. in length and dull at the apex, hair on dorsum of head very sparse, of varying lengths, the longest .045 mm. Some of these hairs are sharp pointed. Prothoracic femora .33 mm. in length, provided with fairly numerous fine sharp pointed hairs, the hairs on the dorsal margin being slightly shorter than the others. Length of prothoracic tibiae .45 mm. provided with numerous hairs, those on the outer margin increasing slightly in length from base to apex, the longest shorter than width of segment, all hairs on this surface dull at the apex. Hairs on inner margin of prothoracic tibiae sharp pointed and decreasing in length from base to apex of segment. Mesothoracic femora .375 mm. in length, length of mesothoracic tibiae .57 mm. Hair on these segments much shorter than hair on similar segments of prothorax, but hair like that on anterior tibiae in character. Length of metathoracic femora varying from .65 - .675 mm. provided with short bluntly pointed hairs on the dorsal surface, hairs on remainder of femora sharp pointed and slightly longer. Metathoracic tibiae varying in length from .93 - .96 mm. The hairs on the outer margin of this segment vary in length from .02 - .04 mm., all but the longest near the apex are blunt at the end or slightly capitate, the longest hairs are almost sharp pointed, in length they are



slightly longer than the width of segment. The hairs on the inner surface of the hind tibiae are all sharp pointed. They vary in length, all are shorter than the width of the segment, and may be spaced one short and one long. First metatarsal segment .14 mm. in length, length of second segment .15 - .18 mm. Dorsum of first tarsal segment with one pair of hairs, on the lectotype these hairs are slightly longer than the width of segment and dull at the end. Hairs on the ventral and dorsal surfaces of the second metatarsal segment short and fine. Hair on dorsum of abdomen exceedingly sparse, and short, not arranged in regular rows. Genital plate broadly transverse, provided with a moderate number of fine, sharp pointed hairs, which cover most of the surface. Median posterior tubercle on cauda not well developed. Both cauda and anal plate provided with long, fine hairs.

This species is perhaps most closely allied to *E. essig* from which it may be differentiated by its longer legs, brownish not dusky cape, longer hairs on tibiae and by the fact that the prothoracic tibiae are distinctly longer than the prothoracic femora. From *E. fusca* Gillette and Palmer this species differs as follows: shorter and almost capitate hairs on dorsal margin of metathoracic femora, shorter and blunter, with some capitate hairs on outer margin of metathoracic tibiae, and cape not so dark.

Holotype, apterous viviparous female, deposited in the United States National Museum collection. Host, *Pinus contorta*. Taken by G. F. Knowlton, Pingree Park, Colorado, August 23, 1935 and determined by him as *E. fusca* Gillette and Palmer. Specimens determined by Palmer as *Essigella pini* Wilson from Cameron Pass, Colorado are of this species.

Slides seen in addition to type: Two paratype slides with same data as type, except date August 19, 1935. Two paratype slides, August 18, 1940, *Pinus contorta* G. F. Knowlton, Cameron Pass, Colorado. One slide *Pinus*, Logan Canyon, Utah, August 24, 1934 G. F. K., and T. O. T.

*Essigella maculata* n. sp.

Plate IV

*Alate viviparous female*

Length from vertex to end of anal plate 2.13 mm. Head and thorax pale dusky green, mid dorsal region of thorax distinctly brown. Abdomen very pale green, free from spots. Antennal segments one and two almost concolorous with head, remaining antennal segments dusky except for base of third segment which is pale. Prothoracic femora pale dusky, except for basal fourth which is slightly paler, tibiae of the same pair of legs dusky, slightly darker at end. Metathoracic femora very pale, tibiae of same legs almost uniform dusky. Tarsal segments concolorous with end of tibiae.

Anterior margin of head with few distinctly spine like hairs, which vary in length from .05 - .06 mm. these hairs are dull at the end. Length of antennal segments as follows: III .20, IV .10 mm., V .09 + .04 mm. Third antennal segment with from three to four sensoria. Remaining antennal segments distinctly imbricated, except the first and second. Hair on antennae almost absent, shorter than space between imbrications. Both margins of prothoracic femora with similar hairs, the hairs being fine, sharp pointed, and about .045 mm. in length. The hairs on the pro-

thoracic femora are not numerous, but are spaced closer together than their length. Outer margin of prothoracic tibiae with coarse hairs, the hairs are dull at the apex and about .045 mm. in length, the hairs on the inner margin of this segment are only half as long as the hairs on the outer margin, and distinctly shorter than this near the apical third of segment. Inner apex of prothoracic tibiae with brush made up of very short fine hairs. Media simple, very faint. Prothoracic femora .405 mm. long. Length of prothoracic tibiae .495 mm. Metathoracic femora .675 mm. in length. Hairs on dorsal margin of metathoracic femora more numerous than hairs on ventral margin, they are fine and very short. Metathoracic tibiae 1.00 - 1.05 mm. long, provided on outer margin with hairs which vary from .04 - .06 mm. in length, these hairs are slightly dull at the apex. Inner margin of metathoracic tibiae with hairs on basal three fourths of segment similar to those on outer margin, but distinctly sharp pointed, fewer than those on outer margin. Hairs on apical fourth of segment distinctly shorter, finer and slightly more droopy. Inner apex of metathoracic tibiae with brush. Dorsum of first tarsal segment with one pair of hairs, hairs on ventral surface of this segment few, short and fine. Hairs on dorsal surface of second metatarsal segment less than two times length of hairs on ventral surface, hairs on both dorsal and ventral surfaces few.

Cornicles not differentiated from abdomen except as rings. Cauda with small median posterior tubercle. Anal plate and cauda with setulae, both with few hairs. The long hairs on the cauda confined largely to the posterior surface, there are a few much shorter hairs anterior to these, ventral surface of cauda with hairs somewhat shorter. Genital plate small, not much wider than deep, with few hairs.

*Apterous viviparous female.*

Length from vertex to end of anal plate 1.68 mm. Color pale green. Femora, tibiae and tarsal segments pale dusky.

Head and thorax.—Anterior margin of head with a few dull short spine like hairs. Antennal segments with the following lengths: III .15 mm., IV .09 mm., V .08 + .04 mm. There are no secondary sensoria. Antennal segments almost without hair. Segments three, four and five coarsely imbricated. Rostrum reaching well beyond metathoracic coxae. Prothoracic femora .375 mm. long, provided with few comparatively short hairs which are similar on both dorsal and ventral surfaces, and varying in length from .01-.035 mm. the long and the short hairs being intermixed, most of the long hairs being dull at the end. First segment of prothoracic and metathoracic tarsi with two pairs of hairs on the dorsum, this segment of the mesothorax has only one pair of hairs on the dorsum. Metathoracic femora .52 mm. in length, provided with comparatively few hairs, the hairs on the dorsal margin being the more numerous. Metathoracic tibiae .825 mm. in length, hairs on outer margin spine like, blue at the apex, varying in length from .015-.03 mm. for the most part spaced farther apart than their length. Hairs on inner margin of tibiae fewer, sharp pointed, slightly shorter, than those on outer margin. First metatarsal segment .09 mm. in length. Second metatarsal segment .18 mm. long, with hairs on the dorsum but little longer than the hairs on the ventral surface.

Cornicles mere rings, slightly dusky. Dorsum of abdomen without

spots. Cauda and anal plate with setulae, both with hairs confined to posterior margins and ventral side. Cauda without median posterior tubercle.

Apterous viviparous females of this species differ from similar forms of *E. hoerneri* Gillette and Palmer by the longer hairs on the tibiae, by having the median tubercle lacking on the cauda, longer hairs on the vertex and longer tibiae.

Holotype, alate viviparous female, morphotype, apterous viviparous female, both deposited in the United States National Museum. Host, *Pinus edulis*, taken Sept. 2, 1956, Grand Junction, Colorado. Both reared from material collected north of Rifle, Colorado in July. This species was associated with specimens of *E. hoerneri*.

This species is known from only three specimens, one of which has been made paratype.

*Essigella monelli* n. sp.

Plate V

*Apterous viviparous female.*

Length from vertex to end of anal plate 2.36 mm. Color in life not recorded. The color of the body is pale yellowish dusky, with the cape only a shade darker than the body. Cornicles pale brown. Apex of third antennal segment and all of fourth and fifth segments pale brown. Femora pale buff with dorsal margins slightly darker. Tibiae pale dusky brown, uniform throughout, tarsal segments concolorous with apex of tibiae.

Antennal segments with the following lengths: III .23 mm., IV .12 mm., V .10 + .04 mm. Primary sensoria on fourth and fifth antennal segments small, not tuberculate. Third, fourth and fifth antennal segments strongly imbricated. Hairs on vertex of head tapering and about .06 mm. in length, they are slightly dull at the end. Remaining hairs on the head sharp pointed, longer and finer than those on the vertex. The rostrum is not in a position to measure. Length of prothoracic femora and tibiae .525 mm. and .65 mm. Length of mesothoracic femora and tibiae .42 mm. and .66 mm. Length of femora and tibiae of metathoracic legs .805 mm. and 1.215 mm. Dorsal margins of pro and mesothoracic femora with numerous, long, slightly dull or sharp pointed hairs, on the metathoracic femora these hairs vary from .05-.08 mm. in length, they are spaced closer together than their length. The hair on the mesothoracic femora are much shorter and fewer than those on the other femora. Hair on prothoracic tibiae numerous, those on the outer margin vary from about .06 mm.-.075 mm. they are rather coarse and dull at the tip, but not blunt. The hairs on the inner margin of the prothoracic tibiae are about .03 mm. long, much finer and sharp pointed, in contrast to the hair on the outer margin. The hairs on the mesothoracic tibiae are much fewer than those on the prothoracic tibiae, also shorter, those on the outer margin being about .03 mm. long, they are rather thick, of uniform width, and definitely dull at the end, the hairs on the inner margin are only slightly shorter, but finer and sharp pointed. For the most part the hairs on the mesothoracic tibiae are shorter than the space between them. Dorsal margin of metathoracic femora provided

with distinctly spine-like hairs which are definitely dull at the end if not slightly capitate, these hairs are fairly numerous, and vary in length from .05-.08 mm. remaining hairs slightly shorter and less spine-like. Metathoracic tibiae with numerous hairs, those on the outer margin are quite upstanding, varying in length from .06-.08 mm. and dull at the apex, if not slightly capitate, on the inner margin the hairs are shorter and finer than those on the outer margin and sharp pointed. All first tarsal segments with one pair of hair on the dorsal surface, the hairs being longer than the width of segment. Second metatarsal segment with hairs on the dorsum much longer than width of segment, hairs on ventral surface of this segment fine and short. All claws of this species differ from the usual condition found in this genus, by not being definitely divided at the apex, but with a single finger-like process at the end.

*Abdomen*.—Hairs on dorsum of abdomen just anterior to cauda slightly longer and thicker than remaining hairs on this surface.

Holotype, apterous viviparous female, in the collection of E. O. Essig. Host, *Pinus tuberculata*, Fort Bragg, California, May 8, 1936, E. O. Essig.

This species may be differentiated from all other known species within the genus except *E. wilsoni* and *E. cocheta* by the claws not being definitely bifurcate. From *cocheta* it may be differentiated by the longer segments of the legs, and longer hairs on the tibiae, as well as the more numerous hairs on the dorsal margin of the metathoracic femora. The hairs on the tibiae of *wilsoni* are much shorter than the hairs on this structure of *monelli* or *cocheta*.

#### *Essigella palmerae* n. sp.

Plate V

##### *Alate viviparous female.*

Length from vertex to end of anal plate 2.49 mm. Color in life not recorded. Mounted specimens show the head and thorax dark dusky brown, with the area median to the eyes somewhat lighter. Antennae with the exception of the pale-yellowish base of third segment dusky brown, to almost black. Femora yellow with dusky brown at apex and along anterior margins. Metathoracic femora lighter than other femora in color. All tibiae and tarsi black. Abdomen yellow, with pigmented spots, some of which are confluent, and for the most part moderately large. Cornicles located within pigmented spots and of the same brownish color. Between the cornicles there is a very irregular pigmented band, which has several clear areas. Some specimens may lack this cross band. Posterior region of abdomen, cauda and anal plate dark brown. Hairs on dorsum of abdomen limited to pigmented areas, those near the posterior end much darker and coarser than those more anterior.

Antennal segments with the following lengths: III .21 mm., IV .10 mm., V. 10 + .05 mm. The third segment has from two to three sensoria. All antennal segments with minute hairs, strongly imbricated. Width of head through the eyes .51 mm. Prothoracic femora very strongly developed, longer and wider than those of mesothorax, and with longer and more numerous hairs. Prothoracic tibiae with numerous hairs, those on outer surface longer and much coarser than those on inner surface.

Mesothoracic tibiae with hairs much fewer, finer and shorter than those on the prothoracic tibiae, the hairs much fewer, finer and shorter than those on the prothoracic tibiae, the hairs on the inner surface being especially sparse, fine and short. Metathoracic femora with dorsal margin with numerous, long, coarse hairs, ventral margin almost free from hairs, and these extremely fine and rather short. Hind tibiae 1.35 mm. in length. Hairs on hind tibiae numerous, varying in length from .10-.12 mm., much longer and coarser as well as more numerous on the outer margin than on the inner. All tibial hairs sharp-pointed. Apex of tibiae enlarged on the inner margin, this region has several fine short hairs. First tarsal segment with five long hairs on the dorsal surface, and as a rule five pairs of the short hairs on the ventral surface, these hairs do not extend the full length of the segment, but have their origin just beneath the first pair of hairs on the dorsal surface. The first tarsal segment varies from .18-.19 mm. in length. The second tarsal segment varies from .225-.25 mm. in length. The cornicles are mere rings. Lateral lobes of thorax with from 24-26 hairs, most of which are confined to the anterior and median region. The median posterior lobe of the thorax is free from hairs. Costal margin of wing smoky, stigma the same. Radial sector bordered with fuscous. Media once branched, very faint. Cubital and anal veins fuscous.

*Apterous viviparous female.*

Length from vertex to end of anal plate 2.55 mm. Color in life not recorded. Mounted specimens indicate that the color was mostly yellowish, perhaps slightly dusky due to a very pale dusky cape. Within the cape there are a few darker pigmented spots each of which gives rise to a short coarse hair. Antennal segments with the following lengths: III .19 mm., IV .09 mm., V .10 + .05 mm. The third segment is without sensoria, the fourth and fifth segments have primary sensoria, that on the fifth segment being located about midway on the unguis.

All antennal segments are strongly imbricated. The antennal hairs are minute and sparse. The rostrum reaches to the metacoxae. The metathoracic tibiae vary in length from 1.125-1.20 mm. Tibial hairs as in alate viviparous female, but the tibiae are not always so dark. The first tarsal segment is .167 mm. in length, the second is .225 mm. long. Cauda with a distinct wart, located in the middle of the posterior margin.

In Palmer's key to the genus *Essigella* in "Aphids of the Rocky Mountain Region" this species keys to *E. californica* (Essig). As indicated herewith *E. californica* (Essig) of Gillette and Palmer is not the species considered to be *californica* in this paper. It differs from the species considered such by Gillette and Palmer, by its larger size, longer tarsal segments, longer coarser hairs on tibiae and femora, and color of tibiae. From *E. fusca* Gillette and Palmer it differs in the tibial hairs not being blunt or slightly capitate, by the longer tibial hairs, and by the absence of the dark cape in the apterous females. Alates of this species differ from alates of *fusca* by having longer hairs on the femora and tibiae, longer tarsal segments and sharp-pointed hairs on the tibiae.

Holotype, alate viviparous female. Morphotype, apterous viviparous female. Both types mounted on the same slide, which has been deposited in the United States National Museum. Host, *Pinus ponderosa*. Summer-

haven, Arizona (near Tucson), Santa Catalina Mts., June 13, 1954.  
F. C. Hottes.

The material seen consists of the types mentioned and several paratype slides, all taken June 13, 1954, with the Types.

*Essigella patchae* n. sp.

Plate IV

*Essigella californica*. Patch Bulletin No. 202 Maine Agricultural Experiment Station pp. 169-170, 1912 (misidentification)<sup>7</sup>

*Apterous viviparous female.*

Length from vertex to end of anal plate approximately 2.17 mm. Color recorded by Patch as green with antennae and legs with dusky tips. Mounted specimens suggest that the color of the body was uniform throughout. Length of antennal segments as follows: III .15 mm., IV .09 mm., V .08 + .03 mm. There are no sensoria on the third antennal segment, the fourth and fifth antennal segments with only primary sensoria. Hair on third antennal segment almost absent, extremely short and fine when represented. Vertex of head with few thick blunt hairs which are about .015 mm. in length. Rostrum extending to base of metathoracic coxae. Prothoracic femora .355 mm. in length, provided with comparatively few hairs which are no longer than those on the vertex of the head. Prothoracic tibiae .375 mm. in length. Hair on outer margin of prothoracic tibiae about .015 mm. in length, rather thick and bluntly pointed, hairs on inner margin extremely sparse, shorter than those on the outer margin and sharp pointed, remaining hairs longer and sharp pointed. Mesothoracic femora with few hairs, hairs on dorsal margin shorter than those on ventral margin, and dull at the apex, remaining hairs on this segment sharp pointed, all hairs on this segment slightly longer near the apex than elsewhere.

Metathoracic femora .63 mm. in length, provided with comparatively few hairs, all of which are more or less subequal in length to those on the vertex of the head, and all of which are sharp pointed. The hairs on the dorsal margin are shorter than the space between them. Metathoracic tibiae .795 mm. in length. Hairs on hind tibiae varying in length from .015-.04 mm. with the shortest hairs near the base. All hairs shorter than the width of segment, and none inclined more than forty-five degrees. Hairs on outer margin distinctly spine like and blunt at the apex. Hairs on inner margin finer than those on outer margin and set at an angle of about sixty degrees, and sharp pointed. These hairs are fewer than those on the outer margin. Metathoracic tarsal segments .10 and .16 mm. in length. The dorsal surface of the first tarsal segment has one pair of hairs. The ventral surface of the second tarsal segment has very few hairs, all of which are shorter than the width of segment, the longest being near the apex, the dorsal surface of this segment also has very few hairs, these are also very short. Tarsal claws bifurcate, but the divisions not equal, shaped like a mitten. Cape apparently absent. Cornicles same color as abdomen.

*Alate viviparous female.*

Length from vertex to end of anal plate 1.82 mm. Patch Bulletin No.

202 Maine Agricultural Experiment Station p. 169 describes the color as follows: "Head light greenish brown with I and II of the antennae concolorous. III, IV and V were each pale at proximal and dark at distal part. Eyes very red. Thorax green with lobes brown, and ventral plate dark brown. Abdomen light but vivid green and thickly speckled with fine dark dots." Antennal segments with the following lengths: III .18 mm., IV .09 mm., V .09 + .04 mm. Third antennal segment with sensoria varying from 3-4. All sensoria on this segment small, and only slightly tuberculate. Fourth antennal segment antennal with primary sensorium small and quite round. All hair on antennae short and fine. Hair on vertex of head varying from .015-.03 mm. in length, and only slightly dull at the end. Prothoracic femora .36 mm. long prothoracic tibiae .48 mm. in length. Hairs on outer margin of prothoracic tibiae in middle region about as long as width of tibiae, hairs near base, shorter than width of tibiae, hairs on this surface distinctly dull at the apex and rather coarse in texture. Hairs on inner margin of prothoracic tibiae fine, sharp pointed, and about half as long as those on the outer margin, not as numerous. Prothoracic femora with few hairs, the hairs are fine, fine, sharp pointed, and about half as long as those on the outer margin margin very sparse and short. Metathoracic femora .675 mm. long. Hairs on this segment very sparse, fine, sharp pointed, those on dorsal margin varying from .02-.03 mm. in length, they are spaced rather apart than their length. Metathoracic tibiae .975 mm. in length. Hairs on outer margin of metathoracic tibiae sparse, varying from .015 mm. at the base to just under .05 mm. towards the apex, these hairs are very much inclined near the base, a condition which may not be normal, beyond the middle the hairs are inclined at an angle of about forty-five degrees, these hairs are sharp pointed. The hairs on the inner margin of the metathoracic tibiae are shorter than those on the outer margin, more uniform in length, and fewer in number. The first tarsal segment has one pair of hairs on the dorsal surface, this segment is .11 mm. in length. The second metatarsal segment is .18 mm. in length, the hairs on the ventral surface are fine and short, being no longer than those on the ventral surface of the first segment, the hairs on the dorsal surface are longer than those on the ventral surface, but still shorter than the width of segment. Media of fore wings simple, stigma not distinctly separated, cell formed by radial sector, similar to that of *E. essigi*. Median posterior tubercle on cauda apparently absent, but this condition may be due to position in which the specimen is mounted.

This species may be differentiated from *E. californica* (Essig) by the media not being forked, by fewer shorter hairs on the femora, by the shorter hairs on metathoracic tibiae, and by the hairs on the prothoracic tibiae being blunt on the outer margin. From *E. pini* Wilson which also has the media simple, this species may be differentiated by the absence of the well developed median posterior tubercle on the cauda, by the longer hairs on the outer margin of the metathoracic tibiae.

Holotype, alate viviparous female, referred to by Patch as *E. californica* (Essig) Stillwater, Maine, July 4, 1909, on *Pinus Strobus*. Morphotype, apterous viviparous female Acc. No. 37-09, Orono, Main, June 27, 1909, on *Pinus strobus*, taken this side of Gilman Falls, Ben-

noek Road, Coll. Henry Millet. Notes by Patch associated with this slide are as follows: "*Lachnus agilis?*" this crossed out and "*Essigella californica* Essig?" added. Holotype in United States National Museum Morphotype returned to the Entomological collection of the University of Maine. One apterous viviparous female taken on *Pinus strobus*, Stillwater, Maine, July 4, 1909 is a paratype.

*Essigella pergandei* n. sp.

Plate I

*Apterous viviparous female.*

Length from vertex to end of anal plate varying from 1.05-1.42 mm. Color notes from life not available. Mounted specimens suggest the color was either yellow or pale green, with the head and thorax slightly darker than the abdomen. Cape either extremely pale or absent. Antennae concolorous with head, with the apex of fourth and fifth segments slightly dusky. Femora concolorous with body, tibiae slightly dusky, as are the tarsal segments. Length of antennal segments as follows: III .12-.13 mm., IV .06-.07 mm., V .07 + .04 mm. Fifth segment with primary sensorium slightly tuberculate. Antennae with minute hairs. Vertex of head with a few short blunt hairs, hairs on dorsum of head slightly longer, finer and more sharply pointed. Rostrum reaching to end of metathoracic coxae.

Lengths of pro meso and metathoracic femora as follows: .33 mm., .27 mm., .42 - .48 mm. Hairs on dorsal margin of metathoracic femora about .015 mm. in length, rather coarse, sharp pointed, other hairs on this segment quite similar. Lengths of pro meso and metathoracic tibiae as follows: .36 - .40 mm., .40 - .45 mm., .615 - .80 mm. Hairs on prothoracic tibiae varying from .015 - .02 mm. in length with the hairs on the outer margin slightly longer and coarser than the hairs on the inner margin, and not quite so sharp pointed. Hairs on mesothoracic tibiae similar to those on prothoracic tibiae, but not quite so long. Hairs on outer margin of metathoracic tibiae varying from .02 - .03 mm. in length. The hairs on the inner margin of the hind tibiae are slightly longer than the hairs on the outer margin, somewhat finer, and sharper pointed. First metatarsal segment varying from .075 - .09 mm. in length, the dorsum with one pair of hairs. Second metatarsal segment varying from .135-.16 mm. in length, the hairs on the dorsum of this segment are not much longer than the hairs on ventral surface and only slightly coarser. All tarsal claws bifurcate. Dorsum of abdomen with a few short coarse hairs, which do not arise from pigmented spots. Cauda with few hairs, the median posterior tubercle is well developed.

Holotype, apterous viviparous female, deposited in the United States National Museum. Host, *Abies concolor*, Seattle, Washington, July 17, 1955, M. J. Forsell collector. Holotype slide and paratype slide with several specimens.

This species is allied to *Essigella wilsoni* from which it differs in having the tarsal claws bifurcate, sharp pointed hairs on the tibiae, longer hairs on the tibiae, and the better developed median posterior tubercle on the cauda.



*Essigella pineti* n. sp.

## Plate I

*Alate viviparous female.*

Length from vertex to end of anal plate 2.275 mm. Color in life not recorded. Cleared with head and thorax dark dusky brown, abdomen clear, possibly light green in life, with five transverse rows of small pigmented spots, each of which is provided with a hair which is about as long as the width of the spot, or but little longer. Cauda and anal plate dusky, both slightly setulose. Cornicles not differentiated from abdomen by color. Antennae dusky brown, except for the base of third segment which is pale. Femora light dusky brown, with dorsal margin slightly darker. Tibiae dark dusky with apical portions darker.

Anterior margin of head with a few long rather coarse hairs, which are slightly capitate at the ends, these hairs are about .06 mm. in length. Dorsum of head with very few hairs, the hairs on the posterior dorsum being much shorter than the hairs on the vertex, all hairs on dorsum of head sharp pointed, and finer than hairs on vertex. Antennal segments with the following lengths: III .24 mm., IV .12 mm., V .08 + .04 mm. Third antennal segment with from two to four sensoria, fourth and fifth segments with only primary sensoria. All antennal segments very coarsely imbricated. Pro, meso, and metathoracic femora with the following lengths: .06, .39, 1.00 mm. Pro, meso, and metathoracic tibiae with the following lengths: .73, .73, 1.50 mm. First and second metatarsal segments with the following lengths: .13 and .23 mm. Prothoracic femora with the dorsal margins with a moderate number of hairs which vary from .03 - .045. These hairs are dull at the apex. Hairs on ventral surface of prothoracic femora very sparse, sharp pointed and about .03 mm. in length. Hairs on mesothoracic femora few, fine, sharp pointed and about .01 mm. in length or even less. Hairs on dorsal margin of metathoracic femora few, hardly .04 mm. in length, dull at the end. Hairs on ventral margin of metathoracic femora shorter than those on dorsal margin, spaced farther apart than their length. Hairs on prothoracic tibiae differing on outer and inner margins, those on outer margin coarse, and dull at the end, the longest in the mid region about .06 mm. in length, the shortest near the base, are hardly .015 mm. in length. The hairs on the inner margin of the prothoracic tibiae are fine sharp pointed and about .03 mm. long. Hairs on mesothoracic tibiae much shorter than width of tibiae. Hairs on metathoracic tibiae varying from .04 - .06 mm. in length on the outer margin, with the hairs near the base somewhat shorter. All hairs on the outer margin of the metathoracic tibiae capitate at the end, and distinctly dull. Hairs on inner margin of metathoracic tibiae fine, shorter than those on the outer margin and sharp pointed. Media once-branched. Stigma ending in a distinct point.

The pigmented spots on the dorsum are small, they are arranged in transverse rows, and each is provided with a short hair, each row is one spot wide. Directly beneath the spots on the dorsum, there are transverse bands of long fine hairs on the venter. Cornicles mere rings. Portion of abdomen dorsal to genital plate with row of coarse bluntly pointed hairs. Genital plate with a few widely spaced hairs. Median tubercle on posterior portion of cauda not well developed.

The abdomen of this species suggests the abdomen of *E. essigi* but the genital plates differ, as do the stigma, the lengths of the prothoracic femora and tibiae, and the length of the tibial hairs.

Holotype, alate viviparous female, returned to the Essig collection. Host, *Pinus ponderosa*, Yosemite, California, May 17, 1938. E. O. Essig, collector. The apterous female mounted on the type slide may or may not belong to this species, and because of this question it is not described.

This species is known only from the holotype.

### *Essigella pini* Wilson

#### Plate III

*Essigella pini* Wilson, H. F. Three New Lachnids with Comparative Notes on three others (Homop.). Ent. News Vol. XXX No. I pp. 2 - 3 1919. Original description.

*Essigella pini* Wilson, Gillette and Palmer 1931: 841, (misidentification).

*Essigella pini* Wilson, Palmer 1952 p. 16, (misidentification).

#### *Alate viviparous female.*

Length from vertex to end of anal plate 1.80 mm. Specimen not cleared, as mounted, head and thorax light dusky. Abdomen yellowish, with small dusky spots on the dorsum, these are arranged in rows, each side of the abdomen has a row of slightly larger and darker spots than those on the dorsum. Femora slightly dusky, tibiae uniform in color, lighter than femora, tarsal segments concolorous with ends of tibiae. Length of antennal segments as follows: III .18 mm., IV .08 mm., V .08 + .025 mm. Third antennal segment with three sensoria, fourth and fifth antennal segments with only primary sensoria. Vertex of head with few comparatively fine dull pointed hairs, other hairs on the head quite similar. Media simple. Prothoracic femora .345 mm. in length, length of metathoracic femora .525 mm. Hairs on dorsal margin of metathoracic femora very short, stubby and dull at the end, hairs on other regions of this segment much longer, finer, and sharp pointed. Metathoracic tibiae .825 mm. in length, hair on this segment of two types, those on outer margin of variable length, usually short to very short, thick, and dull at the apex, hairs of this type are arranged in about three rows, they often have to be looked for, one row is often much shorter than the other two. Remaining hairs on the metathoracic tibiae much longer, finer and very droopy, some almost procumbent. Metathoracic tarsal segments with the following lengths: first .09 mm. second .17 mm. The first tarsal segment has one pair of hairs on the dorsum. Cornicles slightly elevated rings, slightly darker in color than the abdomen. Median posterior tubercle on cauda extra well developed, larger than that of any such tubercle of known species, distinctly nipple like.

#### *Apterous viviparous female.*

Length from vertex to end of anal plate varying from 1.28 - 1.60 mm. Specimens mounted without clearing are a uniform pale yellow, in life most likely pale green. Cape apparently absent. Antennal segments with the following lengths: III .12 mm., IV .07 mm., V .07 + .03 mm. There are no secondary sensoria. Anterior margin of head with a few hairs of variable length, but none long, the distal end of which is dif-

ficult to classify being neither distinctly dull or sharp. Rostrum when extended reaching to coxae of metathoracic legs. Prothoracic femora .30 mm. in length, length of mesothoracic femora .255 mm., length of metathoracic femora .45 mm. Dorsal margin of metathoracic femora provided with a few extra short, dull pointed hairs which are spaced further apart than their length, other hair on this segment very sparse, fine, and slightly longer as well as sharp pointed. Metathoracic tibiae varying in length from .40 - .55 mm., with hairs on outer margin similar to those of alate viviparous female, so short that they have to be looked for, remaining hairs on this segment sharp pointed, for the most parte equal to width of segment, but often shorter, never longer. Cornicles as in alate female. Median posterior tubercle similar to that of alate viviparous female. Cauda and anal plate with numerous fine sharp pointed, rather long hairs. Hairs on dorsum of abdomen extremely sparse, fine and not much if any longer than the slightly elevated area from which they arise.

*Essigella essigi* may be easily differentiated from *pini* Wilson by the much shorter, less droopy hairs on the tibiae, the alates have more spots on the dorsum of the abdomen, the aptera have a well developed cape, and the blunt hairs are more numerous.

All references to this species known to me except those of Tissot refer to other species.

Leototype alate viviparous female in collection of A. A. Granovsky. Morphotype apterous viviparous female also in Granovsky collection Both types from original material described by Wilson and formerly in his collection. Three slides from the aphid collection of the University of Maine have been seen. They are part of the original material and carry the same accession number 82 - 41 over 11. Two of the slides carry the date June 28, 1914, one May 24, 1914, a date not mentioned in the original description. The Maine slides were not determined.

Other slides of this species which have been seen were taken and determined by A. N. Tissot on *Pinus taeda*, Gainesville, Florida, March 3, 1928. On *Pinus taeda*, St. Augustine, Florida, May 5, 1945. Two slides in the United States National Museum are of interest, both contain apterous viviparous females. One slide, with the number 121649 carries the following note, "N. Gen. of Lachnids, on Pine", but no other information. One slide with the number 183t (1.3.66) has the following data. "On Pine, Eufoula, Ala. March 10, 76." This is the first record of specimens of the genus *Essigella* known to me. Both slides appear to have been labeled by Pergande.

***Essigella robusta* n. sp.**

Plate IV

*Apterous viviparous female.*

Length from vertex to end of anal plate varying from 2.10 - 2.32 mm. Color recorded by Essig as green. Cleared specimens indicate the color of the cape as pale buff. Legs pale dusky with the tibiae slightly darker near the apex. Antennal segments one, two and the basal three fourths of the third pale, a remainder of third segment and all of fourth and fifth segments pale dusky.

Vertex of head with a few thick blunt hairs which vary in length from

.015 - .05 mm. The shorter of these hairs do not taper to the end, but are of uniform thickness throughout, the longer hairs taper a little towards the apex. Remaining hairs on head slightly longer than those on vertex, thinner, and sharp pointed. Antennal segments with the following lengths: III .18 - .195 mm., IV .09 mm., V., .109 + .03 mm. Third antennal segment without sensoria. Primary sensoria on fourth and fifth antennal segments small, not tuberculate. Antennal hairs very sparse, fine, and short, difficult to differentiate except on first and second segments where they are better developed. Rostrum when extended reaching to end of metathoracic coxae. Prothoracic femora varying from .48 - .525 mm. in length. Prothoracic tibiae varying from .525 - .65 mm., always longer than prothoracic femora. Mesothoracic femora varying from .405 - .45 mm. in length. Metathoracic femora varying from .705 - .75 mm. Metathoracic tibiae varying in length from 1.05 - 1.08 mm. Prothoracic femora with numerous hairs on dorsal margin, these hairs are almost straight, rather thick and blunt at the end, they vary in length from .015 - .03 mm. There is an irregular row of similar hairs near them on one side of the femora, but the remaining hairs on the prothoracic femora are fine and sharp pointed. The hairs on the prothoracic tibiae are numerous, those on the outer margin are thick, blunt at the end and about .03 mm. or slightly less in length. The remaining hairs on the prothoracic tibiae are the same length as those on the outer margin, but they are somewhat finer, and sharp pointed. The hairs on the mesothoracic tibiae are shorter and fewer than the hairs on the tibiae of the prothoracic pair of legs, on this segment there are also two types of hairs. The hairs on the dorsal margin of the metathoracic femora are about .03 mm. in length, these hairs are straight, and blunt at the end. The hairs on the outer margin of the metathoracic tibiae vary in length from about one third the width of the tibiae, to subequal to width, to just equal to width. These hairs are coarse, thick, and dull at the end, they vary in length from .015-.45 mm. First tarsal segment of metathoracic legs varying from .12 - .14 mm. This segment, like the first tarsal segment of the prothoracic and mesothoracic pairs of legs has two pairs of rather coarse hairs, of which the more basal pair is shortest, the dorsal hairs are blunt at the end. The second metatarsal segment varies from .17 - .23 mm. in length, it has few hairs, as a rule the hairs on the dorsal surface are coarser and slightly longer than the hairs on the ventral surface, the apical dorsal hairs being longest.

Dorsum of abdomen with a few transverse rows of short coarse hairs, the hairs just anterior to the cauda being longer and coarser than the hairs more anterior. The genital plate has the long fine sharp pointed hairs uniformly distributed over its surface, the lateral margins of this structure are irregular, at times even toothed.

This species is much larger than *E. essigi* and lacks the dusky cape of *essigi* and also has two pairs of hairs on the dorsum of the first tarsal segment. From *E. braggi* it differs in shorter hairs, by having two pairs of hairs on the dorsum of all first tarsal segments, and finer, shorter, not bristle like hairs on the antennae. The two species have much the same body shape.

Holotype, apterous viviparous female, returned to the Essig collection.

Host, *Pinus contorta* (lodgepole pine), alt. 7500 ft. upper Echo Lake, California. Aug. 6, 1937, E. O. Essig, collector.

This species is known from only one collection. Twelve slides have been made paratype.

*Essigella swaini* n. sp.

Plate II

*Apterous viviparous female.*

Length from vertex to end of anal plate varying from 2.02 - 2.10 mm. Color in life not recorded. Mounted specimens which have been cleared are very pale throughout, with some specimens showing a very pale buff colored cape. Apical portion of third antennal segment and remaining antennal segments slightly dusky. All legs light dusky, uniform in color.

Antennal segments with the following lengths: III .17 - .19 mm., IV .09 - .10 mm., V .075 - .08 + .03 mm. Hair on antennae extremely sparse, almost totally lacking, the few hairs present not longer than the space between imbrications and very fine. First and second antennal segments likewise almost free from hair. Third segment of antennae without sensoria, primary sensoria on fourth and fifth antennal segments small, not tuberculate. Rostrum when fully extended with last two segments extending beyond metathoracic coxae. Vertex of head with a few short stubby hairs, remaining hairs on head short, fine, and sharp pointed.

Dorsum of thorax and abdomen with a very pale buff colored cape. Hair on dorsum of abdomen extremely sparse and so short that it can only be seen on specimens mounted on their side. Cornicles mere rings, slightly elevated from the abdomen. Cauda with median posterior tubercle. Prothoracic femora varying from .36 - .43 mm., mesothoracic femora varying from .30 - .31 mm., length of metathoracic femora varying from .54 - .72 mm. each extreme represented by a single specimen. Most common length of metathoracic femora is .62 mm. All femora with few hairs, which are short and fine. The hairs on the dorsal margin of the metathoracic femora are blunt at the end, slightly curved, and for the most part farther apart than their length. All tibiae with few, extremely short fine hairs, of which those on the outer margin are short and blunt at the end, in contrast with the remaining hairs which are slightly longer and sharp pointed. In cases the tibial hairs are so short and sparse that they have to be looked for. The metathoracic tibiae vary in length from .82 - .91 mm. The first tarsal segment of the metathoracic legs is .09 mm. in length, this segment has two long curved hairs on its dorsal surface. The second segment of the metathoracic tarsus varies from .17 - .19 mm. this segment has few hairs, they are short, and about the same length on the dorsal and ventral surfaces.

*Alate viviparous female.*

Length from vertex to end of cauda varying from 1.20 - 1.38 mm. Color as indicated by uncleared specimens most likely dusky green. Antennae and legs pale dusky, quite uniform throughout.

Length of antennal segments as follows: III .20 - .21 mm., IV .11 mm., V .08 - .09 + .04 mm. Third, fourth and fifth antennal segments with one sensorium each. All antennal segments well imbricated. Third and fourth

antennal segments without hairs, hairs on fifth limited to the apex of the unguis. Primary sensorium on fifth antennal segment not tuberculate, located on the unguis small, and apt to be overlooked. The marginal sensoria on this segment are bunched at the junction of the unguis and base of the fifth segment, they are apt to be taken for the primary sensorium. First and second antennal segments with hardly any hair. Vertex of head with a few short blunt hairs. Rostrum extending beyond metathoracic coxae by about the last segment. Media once forked, wings rather pale. Prothoracic femora varying from .43 - .47 mm., metathoracic femora varying from .67 - .73 mm. Prothoracic tibiae varying from .46 - .48 mm. always slightly longer than femora. Metathoracic tibiae varying from 1.09 - 1.20 mm. Dorsal margins of all femora with short, fine, slightly dull hairs, which are weakly curved and spaced as a rule so that there is no overlapping. The tibial hairs are longer than the hairs on this segment of the apterous female, but may be classed as short. Hairs on prothoracic tibiae numerous, more numerous on outer margin than on inner. On the outer margin they vary in length from .04 - .05 mm. they are slightly longer than the width of segment, and blunt at the apex, remaining hairs on this segment, sharp pointed. Metathoracic femora very slender. Hairs on outer margin of metathoracic tibiae shorter than width of segment and dull at the end, these hairs are slightly curved, and so spaced that they just barely overlap. The hairs near the base of the tibiae are much shorter than those near the middle, while the hairs near the apex are slightly longer and much more inclined, being almost procumbent. The hairs on the inner surface of the metathoracic tibiae are short, at least some are upstanding, they are at times widely spaced. The dorsal surface of the first tarsal segment has two pairs of hairs. The hairs on the ventral surface of the second metatarsal segment are but a little shorter than those on the dorsum. The hairs at the apex of this segment on the dorsal surface are much longer than other hairs on this surface. The specimens are not sufficiently cleared to show the cornicles, or to differentiate the cauda and anal plate.

Holotype, apterous viviparous female, taken on *Pinus sabiniana*, Kelseyville, California, April 12, 1936, collected by P. Schulthesis. Morphotype, alate viviparous female on *Pinus sabiniana* (Digger Pine), Kelseyville, California, July 15, 1935, E. Daybell collector. Both slides are in the Essig collection. Two slides of this species taken on Pine, Pinnacles National Monument, San Benito, California, April 24, 1948, collected by J. W. MacSwain have been seen. Another slide taken on *Pinus sabiniana*, May 20, 1916 at Red Bluff, California by C. B. Weeks is in the Essig collection.

This species is allied to *E. essig* from which it may be differentiated at once by the lack of a deeply pigmented cape in the apterous forms, by shorter and fewer tibial hairs, and by longer femora and tibiae, and by the fact that the media is once forked.

#### *Essigella wilsoni* n. sp.

##### Plate II

#### *Apterous viviparous female.*

Length from vertex to end of anal plate varying from 1.42 - 1.80 mm. Color notes taken from living specimens not available. Cleared speci-

mens indicate that the color was more or less uniform, probably very pale yellow, or green, with the dorsum covered by a very pale dusky cape only slightly darker than the rest of the body. Fourth and fifth antennal segments slightly darker than remaining segments. Femora slightly darker than body, tibiae and tarsal segments darker than femora, but at most pale dusky. Cauda and anal plate dusky. Cornicles with rim slightly darker than surrounding area. Abdomen in adults free from pigmented spots, but immature specimens with light pigmented dorsal spots from which a hair arises.

Antennal segments with the following lengths: III .12 - .15 mm., IV .067 - .08 mm., V .075 - .08 + .03 mm. Hair on antennae minute. There are no secondary sensoria. All antennal segments imbricated. Anterior vertex of head with a few short blunt pointed hairs, elsewhere on the head the hairs are longer and sharp pointed. Rostrum reaching to end of metathoracic coxae. Metathoracic femora varying from .45 - .57 mm. in length, provided with short rather coarse sharp pointed hairs, on the dorsal margin these hairs are slightly farther apart than the hairs are long. Hind tibiae varying from .60 - .85 mm. in length, provided with comparatively few hairs which differ in character on the inner and outer margins. The hairs on the outer margin being short, measuring about .02 mm. in length near the middle of the tibiae, and with a blunt end. Near the apex of the tibiae, on this surface the hairs are slightly longer than they are near the middle and sharp pointed. The hairs on the inner margin of the hind tibiae are longer than those on the outer margin, and all are sharp pointed at the end. The longest hairs on this surface however, are considerably shorter than the widths of the tibiae. First segment of the hind tarsus varying from .075 - .10 mm. in length, this segment has one pair of hairs on the dorsal surface, the hairs on the ventral surface of this segment are few and confined largely to the apical half of the segment. The claws of this species are not distinctly bifurcate in all cases, and in some specimens distinctly not so. In the latter case the condition may be due to one terminal claw not developing. Dorsum of abdomen with very few extremely short blunt hairs. Cornicles with rims slightly elevated on very low cone-shaped areas. Cauda with median posterior tubercle.

This species is closely allied to *E. pergandei* from which it differs in not having the claws distinctly bifurcate, in having the hairs on the outer margin of the tibiae blunter at the end, coarser hairs on the dorsal margin of the metathoracic femora, and the median posterior tubercle on the cauda not so well developed.

Holotype, apterous viviparous female, taken on *Pseudotsuga menziesii* (Douglas fir), Whitby Island, Seattle, Washington, Aug. 29, 1955 by M. J. Forsell. The holotype is in the collection of E. O. Essig. One paratype slide with several specimens with the same data as the holotype has been seen. Mr. Forsell sent part of the original material to F. C. Hottes, none of which is in good condition.

Prof. H. F. Wilson for whom this species is named, in a paper which he published in 1919, mentions a species of *Essigella* which he calls *californica* (Essig) as having been collected on *Pseudotsuga douglassii* at Corvallis, Oregon. His figure of the hind leg of this species, particularly the hairs on the tibiae, strongly suggest that he was dealing with

specimens of the species *wilsoni*. Of this I have no proof, however this figure is not in agreement with the hairs of *E. californica* (Essig). It should be noted that Wilson's figure is that of an alate viviparous female, in the text he mentions the hairs on the legs as being long, prominent and spine-like in the apterous form, again hardly characteristic of *E. californica* (Essig). Again I have no proof, but I suspect that Wilson described the species here called *E. gillettei*, while his figure at least in part was drawn from *wilsoni*. It should be noted that part of Wilson's material which he determined as *californica* had *Pinus ponderosa* as host.

Wilson, H. F.

1919 Three New Lachnids With Comparative Notes on Three Others (Homop.). *Entomological News* Vol. XXX pp. 1-2 figs. 1-6.

*Key to Species of Essigella*

1. Tarsal claws with ends not distinctly bifurcated..... 2  
Tarsal claws with ends bifurcated..... 3
2. Hairs on outer margin of hind tibiae .06 - .08 mm.; metathoracic femora .805 mm.; metathoracic tibiae 1.2 mm..... *monelli* n. sp.  
Hairs on outer margin of metathoracic tibiae .04 - .07 mm.; metathoracic femora .70 mm.; metathoracic tibiae 1.08 mm.....  
..... *cocheta* n. sp.  
Hairs on outer margin of metathoracic tibiae .015 - .02 mm.; metathoracic femora .45 - .57 mm.; metathoracic tibiae .60 - .85 mm.  
..... *wilsoni* n. sp.
3. Hairs on first, second and third antennal segments coarse, distinctly bristle-like..... *braggi* n. sp.  
Hairs on first, second and third antennal segments not coarse, not distinctly bristle-like..... 4
4. First metatarsal segment .12 mm. or more..... 5  
First metatarsal segment less than .12 mm..... 11
5. Cape of apterous forms extremely dark, blackish-brown.....  
..... *fusca* Gillette and Palmer  
Cape of apterous forms present or absent, not blackish-brown..... 6
6. Hairs on dorsal margin of metathoracic femora .06 - .08 mm.; hairs on outer margin of metathoracic tibiae .09 - .12 mm..... 7  
Hairs on dorsal margin of metathoracic femora .05 mm. or shorter; hairs on outer margin of metathoracic tibiae not longer than .08 mm. .... 8
7. First metatarsal segment .16 - .19 mm.; third antennal segment of alate viviparous female .21 mm.; fourth antennal segment .10 mm.; tibiae very dark; tibial hairs coarse on outer margin .10 - .12 mm. black; hairs on dorsal margin of metathoracic femora .075 - .09 mm.  
..... *palmerae* n. sp.  
First metatarsal segment .11 - .15 mm.; third antennal segment of alate viviparous female .25 mm.; fourth antennal segment .15 mm.; tibiae dusky but not dark; hairs on tibiae not coarse on outer margin, not dark; hairs on dorsal margin of metathoracic femora .06 - .07 mm..... *gillettei* n. sp.
8. Hairs on mid region of outer margin of metathoracic tibiae .02 - .03 mm. .... 9



- Hairs on mid region of outer margin of metathoracic tibiae .04 - .08 mm. ----- 10
9. Metathoracic femora .75 mm.; hairs on vertex blunt, distinctly spine-like, .03 - .04 mm. in length; second metatarsal segment .17 - .23 mm. long; caepe pale; hairs on dorsal margin of metathoracic femora numerous; a robust species ----- *robusta* n. sp.  
Metathoracic femora .65 mm.; hairs on vertex coarse, blunt, not over .03 mm. in length; second metatarsal segment .15 - .18 mm.; caepe distinct; hairs on metathoracic femora few; a medium sized species ----- *knowltoni* n. sp.
10. Metathoracic femora of alate viviparous female 1.00 mm. in length; hairs on outer margin of metathoracic tibiae .04 - .06 mm. distinctly dull at end ----- *pincti* n. sp.  
Metathoracic femora of apterous viviparous female .84 - .95 mm.; hairs on outer margin of metathoracic tibiae .03 - .07 mm. not distinctly blunt at end; caepe pale ----- *agilis* n. sp.
11. Greatest length of hairs on mid region of outer margin of metathoracic tibiae .03 mm. as a rule much less ----- 14  
Greatest length of hairs on mid region of outer margin of metathoracic tibiae more than .03 mm. ----- 12
12. Hairs on outer margin of metathoracic tibiae .03 - .07 mm. metathoracic femora of aptera .63 mm. of alate .72 - .78 mm. media once branched; caepe absent ----- *californica* (Essig)  
Hairs on outer margin of metathoracic tibiae not longer than .06 mm. as a rule much less; media simple ----- 13
13. Hairs on vertex of head not less than .03 mm.; hairs on outer margin of metathoracic tibiae sharp-pointed ----- *maculata* n. sp.  
Hairs on vertex of head less than .03 mm.; hairs on outer margin of metathoracic tibiae blunt at end ----- *patchae* n. sp.
14. Apterous females with distinct caepe ----- *essigi* n. sp.  
Apterous females with caepe absent or indistinct ----- 15
15. Median tubercle at apex of cauda especially well developed, distinctly wart or nipple-like ----- *pini* Wilson  
Median tubercle at apex of cauda not especially well developed, not wart or nipple-like ----- 16
16. Hairs on outer margin of metathoracic tibiae of apterous viviparous females .02 - .03 mm. ----- 17  
Hairs on outer margin of metathoracic tibiae hardly over .01 mm. 18
17. Size small not over 1.42 mm. third antennal segment .13 mm. at most; greatest length of metathoracic tibiae 0.4 mm. -----  
----- *pergandei* n. sp.  
Size large, 1.80 mm. up to 2.12 mm. in length, third antennal segment .18 mm. long, length of metathoracic tibiae .77 - .90 mm. -----  
----- *claremontiana* n. sp.
18. Antennal segment three of apterous viviparous female .10 - .15 mm.; prothoracic femora and tibiae about equal in length -----  
----- *hoerneri* Gillette and Palmer  
Antennal segment three of apterous viviparous female .19 mm.; prothoracic tibiae longer than femora ----- *swaini* n. sp.